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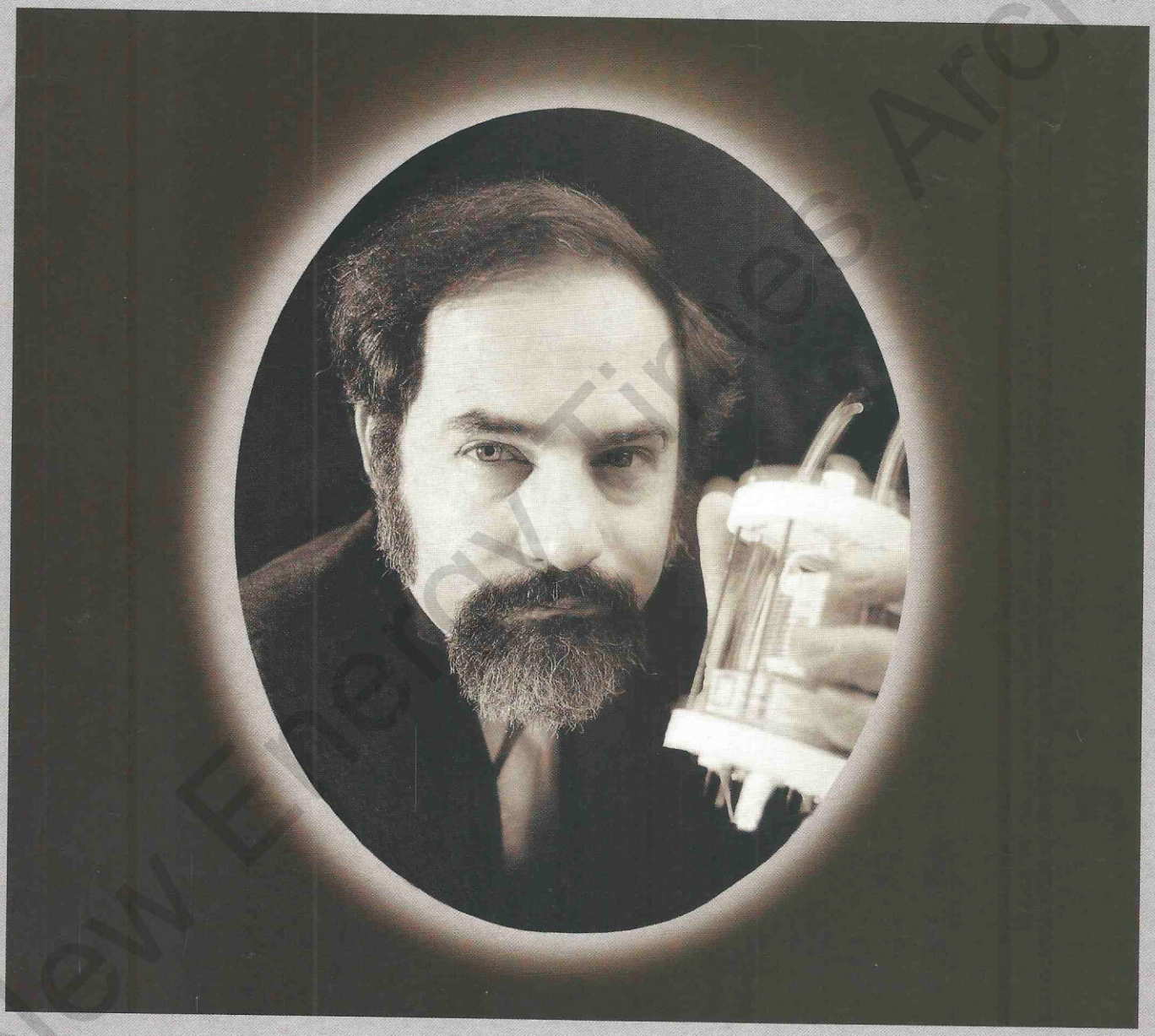
The Magazine of New Energy Science and Technology

New Energy • New Science • New Technology

Volume 10 • Issue 56 • 2004

Dr. Eugene Mallove — 1947-2004



A tribute to our editor — a tireless new energy advocate, loving husband and father, devoted friend.

56

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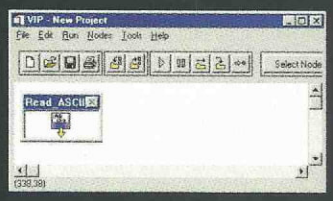

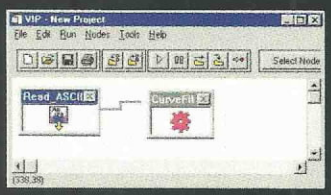

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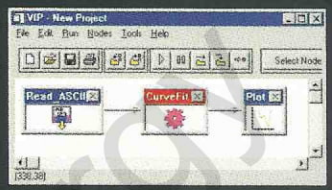

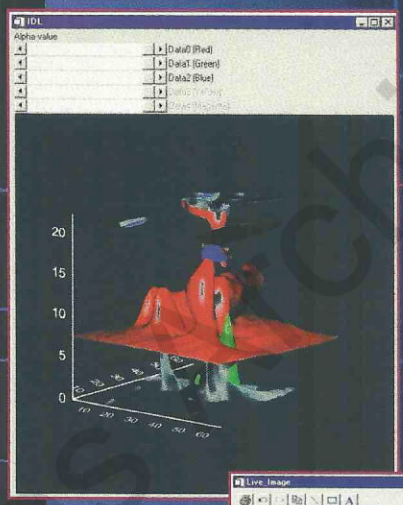

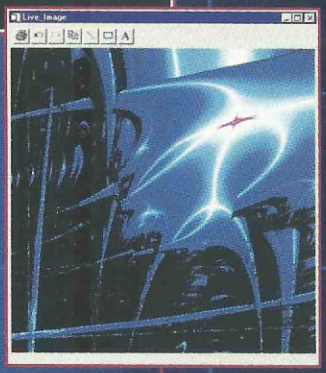

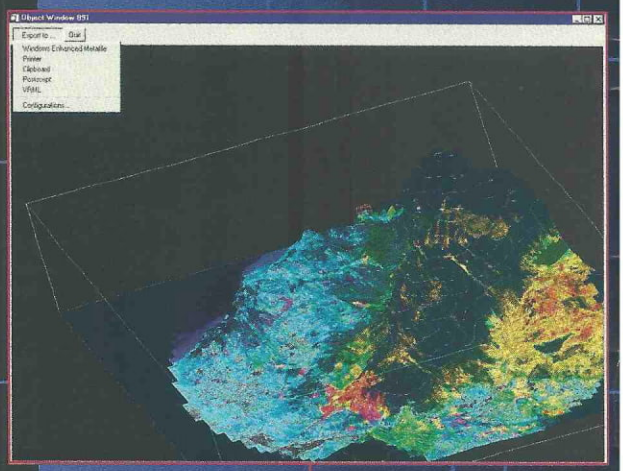

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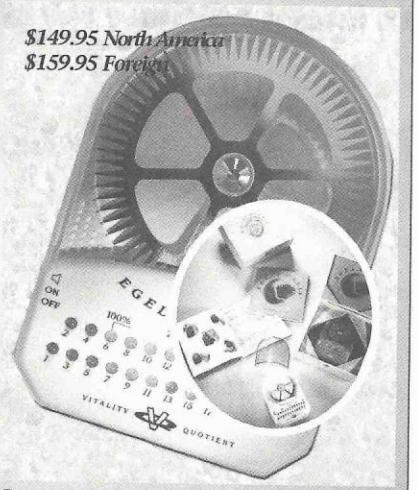

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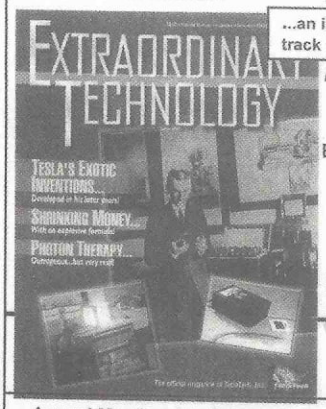

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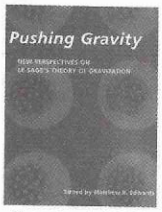

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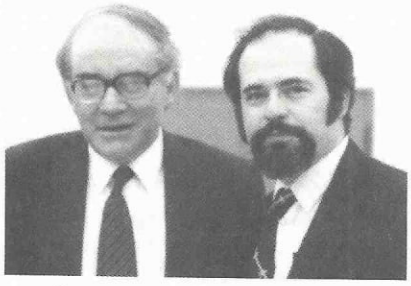
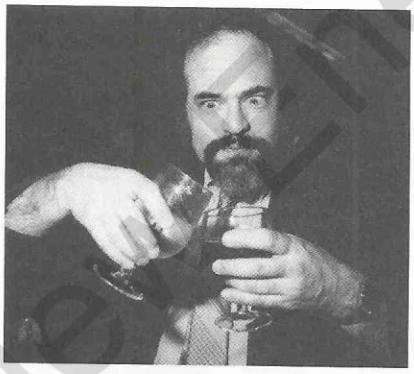
The Magazine of New Energy Science and Technology

Tributes to Our Editor from family, friends, and colleagues:

pp. 4—35



Gene Mallove and Martin Fleischmann at ICCF3.



Gene—ever the experimentalist!

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Memorializing Gene

Bill Zebuhr

We have all suffered a great loss. Gene Mallove was killed on the evening of Friday, May 14. He was at his childhood home in Norwich, Connecticut, cleaning up between tenants, when he was murdered in an apparent robbery. *Infinite Energy* will provide reports as more details become available.

Gene's tragic death made me wonder once again about the nature of the universe. How can a brilliant, hard working, loving individual who has contributed so much and asked for so little be killed by worthless thugs? Maybe we need to rethink the whole issue of personal defense.

I only knew Gene for about three years, but we became very good friends quickly. The news of his death was probably the most horribly shocking I have ever heard. Gene asked me to be Chairman of the New Energy Foundation (NEF) Board of Directors because of my background and my strong interest in *Infinite Energy* Magazine and the peripheral projects he was involved in. Neither one of us expected that I would have to do very much hands-on work in that role, but all that has changed. That is how I happen to be writing this.

The NEF is a 501(c)(3) nonprofit foundation that allows contributors to take a federal tax deduction. Its purpose is to promote the exploration of new science and technology that is energy related and out of the realm of conventional paradigms. The NEF does this primarily through publication of *IE* and secondarily through direct grants to inventors/scientists and organizations working in the "new energy" field.

The NEF was formed in the Fall of 2002. The former company's (Cold Fusion Technology) major assets, including *Infinite Energy*, were transferred to the foundation. After a lengthy battle with the IRS, Gene was able to get the foundation its non-profit status in July 2003. The NEF Board of Directors believes that the NEF has enough history and enough depth that even though Gene's presence was pervasive, his work can continue without him—and this is surely what he would want from us. The Board of Directors and staff of *IE* are fully and enthusiastically committed to building on Gene's goals and visions.

We would like to take this opportunity to formally introduce the NEF Board of Directors. Members are Rick Broussard (Vice-Chairman), Mark Aldrich (Treasurer), James Kazan (Secretary), and myself (Chairman).

I am a mechanical engineer (master's degree, Cornell University) with experience in the large corporation world, the defense industry, and extensive experience as an inventor and entrepreneur in the energy and environmental fields. I am currently founder and CEO of Ovation Products Corporation, which has developed a small vapor compression distiller which has broad application in cleaning water for domestic and industrial use worldwide (see Ovationproducts.com). I have about thirty patents and have a great interest in finding creative solutions to address the world's energy and environmental issues.

Rick Broussard is Editor-in-Chief of *New Hampshire Magazine* and a writer of numerous articles on topics related to culture and science. Along with his role as a board member for the New Energy Foundation, he is a board member of the New Hampshire Stories, Inc. board, a member of the New Hampshire Humanities Council board of advisors, and committee chairman for the New Hampshire Theatre Awards.

Mark Aldrich is currently the Economic Development Director of Claremont, New Hampshire. In December 1999, he retired after working for twenty years for the United States Senate, where he was the N.H. Chief of Staff to United States Senators Bob Smith and Gordon Humphrey. Mark was responsible for the administration of the Senators' four New Hampshire offices and served as the Senators' state representative and intergovernmental liaison, representing them at various events and ceremonies. He also had a major role in advising the Senators on major environmental issues affecting the state. He is a graduate of the University of New Hampshire with a degree in political science (minor in anthropology), and he holds an MBA from New Hampshire College. He is also a licensed NH real estate broker.

Jim Kazan is a New Hampshire lawyer and a partner in the firm of Kazan & Shaughnessy, located in Manchester, New Hampshire. He graduated with high distinction from the University of Iowa College of Law in 1973. Before entering private practice in New Hampshire in 1980, he served as a law clerk to both the United States 8th Circuit Court of Appeals in St. Louis, Missouri, and the New Hampshire Supreme Court. He has also served as an Assistant Commissioner of the New Hampshire Insurance Department and as a New Hampshire Bar Examiner. Jim became acquainted with Gene a number of years ago at Temple Beth Jacob in Concord, New Hampshire, where both of them served on the Board of Trustees. Later, as an officer of the Temple, Jim worked with Gene in presenting a series of lectures on "Science & Religion," all of which featured Gene. Although Jim does not have a formal science background, he is an amateur astronomer and loved talking with Gene about science topics.

The Board of Directors elects and directs the executives of the organization, in addition to other responsibilities (which will now be more formal and broadened). This is still a small organization. Gene was the President of the NEF and Editor-in-Chief of its magazine and Christy Frazier is the Managing Editor of the magazine. Since Christy was active in the business operation of the NEF and *IE* with Gene, she has recently been given the title of General Manager of the NEF and will perform many of the executive business functions. Her dedication, talent, judgment, and energy throughout this difficult and emotionally draining transition has been amazing. We will need to replace Gene's editorial function and his technical expertise, but the operation is in excellent hands.

There will be a transition period where *IE* will continue as it has been, but with guest editorials. Readers will be happy to know that the next four issues of *IE* will primarily be made up of materials that Gene himself had authorized. Decisions regarding direction and content will be mostly made by Christy and myself with input from our Board members,

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Scientific Advisory Board, past contributors, associates, and friends of Gene who have been involved in some way with the foundation or magazine. There is a great deal of will and ability in this group to not only continue but to build on and improve. We also welcome constructive suggestions from readers as to content, direction, and form.

If there is any silver lining to the awful event of Gene's death it is that I have had the good fortune to know some of these outstanding people that are, and will be, helping. I have also gotten to know Gene's wonderful family better. His wife Joanne, daughter Kim, and son Ethan all have been very helpful in spite of their trauma. The foundation is working with them to ease the transition as much as we can. Kim and Ethan are interested in taking a more active role in helping to continue their father's work and these efforts will be integrated in as time goes on.

None of the foundation's work could get done without money. We are extremely grateful that our major contributors have confidence in the NEF team and have been very supportive. We are also grateful for all the contributions that came in after Gene's death to help assure his work will continue. Of course, every reader is a supporter and we thank you all. One of our goals is to find more like you.

The transition period will probably be four or five issues. During that time we will seek additional Board members to add depth and facilitate activities such as fund raising, finding new editorial talent and new material, and filling Gene's important role as a major new energy contact for inventors, investors, and the press. Gene stated in the last issue (*IE* #55, p. 6) "that *IE* must be a mixture of original scientific research and explanatory and motivating editorial material." Explanatory to make "difficult scientific concepts accessible to lay audiences" and motivating because it is not always clear what paths should be taken and many paths are rough. Matching Gene's spirit will not be easy, but we will try our best.

Change will be inevitable because of the people involved and because technology moves on. We will maintain the general high quality of the science reported and will seek as big an audience as possible for such quality. We will continue to be controversial because that is the very nature of new science. We will continue to pull at the threads of the fabric of conventional science and will hope for some good ripping sounds. We have to be able to live with the uncertain and admit that we often don't know the answers. Some theories look good for awhile and then look silly. These are chances we have to take to exist in our chosen niche. We will try to avoid "ownership" of ideas so that we don't acquire a vested interest and lose our sense of openness and fairness. We want to maintain a healthy outlook and perspective so that readers can sense the importance of the science and technology in a proper world view. Hopefully this will motivate activity in directions that yield the most benefit to the planet and to the individuals doing the work.

The Board and management of NEF and *IE* are dedicated to the cause. We believe this is very important work and can evoke major changes far beyond what the size of our readership might suggest. We are there for the few who are really capable of changing the world. Science and technology drive world change and the spirit of discovery can drive the technology.

We owe gratitude and eternal thanks to Gene Mallove for his important contribution to the world. Founding *IE* and the NEF is just, to use one of Gene's favorite expressions, "the tip of the iceberg" of what Gene has accomplished for new energy science. The tributes in this special issue are just some of the many proofs that Gene was a good, honest man who fought for what he believed in—in all areas of life, not just science. May Gene's spirit guide us to new heights.

Contributions to the New Energy Foundation

(Received May-June 2004)

The New Energy Foundation, Inc., a 501(c)(3) charitable corporation, gratefully acknowledges the following generous contributions toward its work of (1) publishing worldwide via *Infinite Energy*, its website, and other media a broad spectrum of new energy science and technology, and (2) awarding grants for meritorious new energy research projects:

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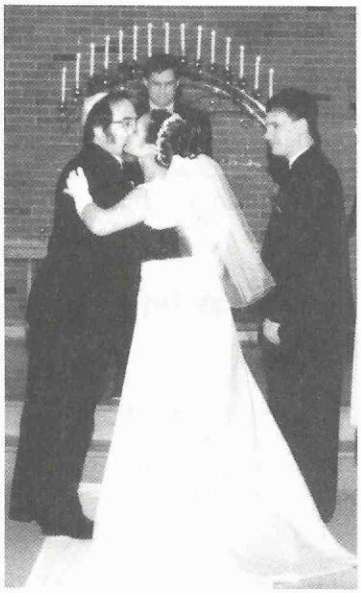
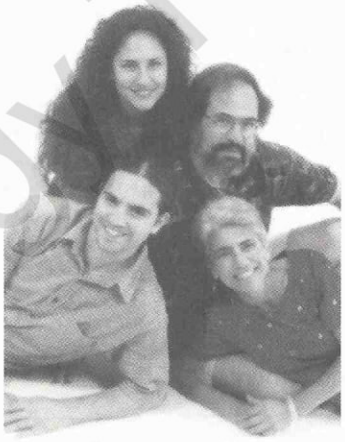


In Memory of My Father

Kimberlyn Woodard (kpmalard@comcast.net)

As I sit to write a tribute to my dad, I find it very difficult to do because words don't seem to express my feelings completely. Words just don't come together well enough to express the feelings I have for the great life he led, as well as his senseless death. How am I supposed to move forward with my life? My heart is broken. My mind races with questions: "How could this have happened? How can this be part of my life story? How can someone so full of life be gone forever? How can my dad, who dedicated his life to seeking truth and making the world a better place, be gone?" I can't get over the fact that life is so unfair. Bad things do happen to good people. My dad lived such an honest and full life. He had accomplished so much and had so much more to offer to the world. As many have said to me, his death is a tragic loss to the family as well as the world.

When I sit quietly in my parents' home, there are remembrances of my dad all around me. The phone rings and the answering machine announcement, which I always told him was too long, goes off. His voice telling every single caller that they can ". . .leave a message of any length"; this was so important for him to convey. The family portrait I gave to my mom for Mother's Day sits on the mantle. It was a whimsical photo we took in casual clothing just a few years ago, one of the only family portraits in which my dad wears his glasses and smiles his usual smile. The enormous new flat-screen, high-definition TV that my mom had just bought for him looms at the front of the living room. It's hard to watch anything on it without having him there to point out the amazing picture quality and terrific sound. The cat quietly walks across the floor and I'm reminded of how when I'd call my parents to video chat so they could see their first grandbaby, my dad insisted he put the cat on the desk so I could see his baby. I walk into the kitchen and can imagine my dad grabbing some lunchmeats from the refrigerator, making yummy sounds as he eats and asking me if I wanted some too, seeming surprised when I said no. In the hall closet I find the dark, wide-brimmed cowboy hat my dad wore everywhere. It was always easy for me to spot him at the Manchester airport as he rushed to meet us, Dunkin' Donuts coffee in hand, when my husband and I would visit from Seattle.



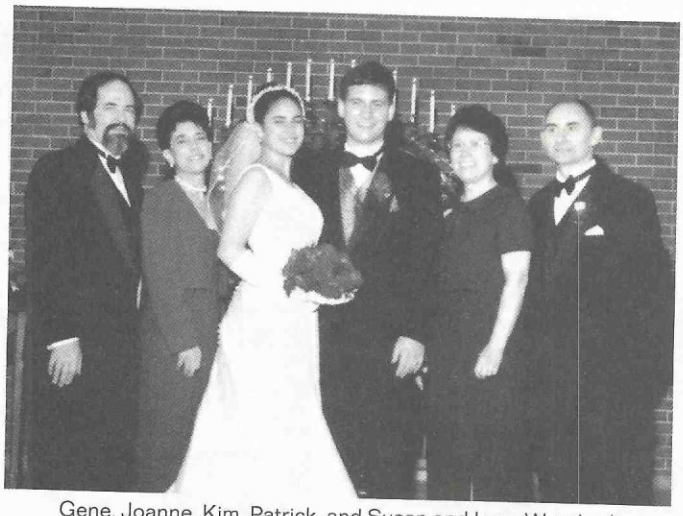
Kim, Gene, Ethan, and Joanne

It is too painful to imagine what our lives are now going to be like without him at the Thanksgiving table, with an empty seat in our family room as we open Channukah gifts, no Father's Day or birthday gifts to buy, no running from his home office to the post office daily, no one to sit at the kitchen table with us explaining the marvels of what is "mind boggling" in the field of new energy. It's hard to imagine how the person to whom I would seek protection from as a child will not be there to protect me anymore. The father who, when I was a child, would poke fun at me because I'd hide under the table during my temper-tantrums shouting, "Don't look at me!" The person who would playfully gallop with me around the house and fling me onto the bed. He was so proud of me when I became a teacher like his mother. He would often stare at me across the table, almost in amazement that he and my mom had created such a successful, independent woman. I'm so deeply saddened that he will not see me continue to grow in my life as a mother. There were so many things I planned on sharing with him.

My dad was a very sentimental person. Walking into either of his offices, at work or home, you might think he needed to do some spring cleaning. But take a closer look and you see the things he cherished. An E.T. doll he'd bought me and my brother when the movie first came out, encased in glass, with Steven Spielberg's autograph. He loved to tell the story of how he was visiting the SETI dish and Steven Spielberg was there. As the famous director was leaving, swarmed by reporters and fans, my dad stuck out the E.T. doll hoping desperately for an autograph, exclaiming, "Mr. Spielberg, please sign this!" Out of the crowd Mr. Spielberg chose my dad's doll and signed it. It was on the news that night, too! It was almost childlike, the way my dad told this story with such excitement so many times. He has a letter he wrote to Neil Armstrong and the response he got back, framed in glass after my brother was born. He loved the space program and had so much admiration for the first man to land on the moon, so much so that he gave my brother the middle name "Armstrong." The first donation he ever got upon beginning the New Energy Foundation, along with a best-wishes note from the friend who wanted to be the first to contribute, is framed on his office wall. As I look around his home office, there's a wonderful picture, that I also have in my own home, of me hugging my brother one year at Stellafane, a place where our family would go every year when Ethan and I were just kids, so that my dad could talk to people about telescopes and astronomy. When he and my mom came to visit this past February to meet their first grandchild, Matthew was one week old. My dad had purchased a *New York Times* the day after his birth, February 28. He bought a special plastic envelope while we shopped at a stamp store and later gave this to me along with the newspaper, almost embarrassed because he thought I'd think he was such a silly old sap. He wanted Matthew to be able to look back and see what was going on in the world the day he entered it. When my parents helped

New Energy Times Archive

me brave the mall with a brand new baby, my dad trailed behind my mom and me as we picked out new baby-boy outfits. Upon meeting up with us a bit later, he radiated with excitement at his amazing find. He was able to buy Matthew his first model car. . .and it was on sale!



Gene, Joanne, Kim, Patrick, and Susan and Lynn Woodard at Kim's wedding in December 1998.

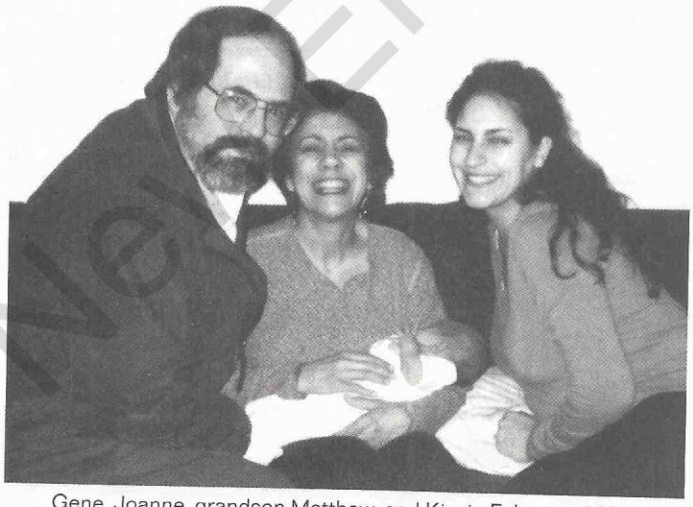
He loved his childhood home in Norwich. It's heartbreaking to think how safe he felt in that home, the place where his life began, but also ended. He had so many memories there. It's why he never sold it despite his parents moving some twenty years earlier and the family pleading with him to let go of it. The state had slowly been taking the land to build a wider road as the area grew and grew. The next step was to take the entire house. He was so desperate not to let the state take his home that he was looking into having the house physically moved to another location. What I once regarded as clutter in my dad's offices now reminds me of how important it was for him to document special times in his life with some sort of remembrance.

My dad brought liveliness and playfulness to our family. He had such a strong presence in our home. His energy and excitement filled the place. Now our home is quiet. There's an emptiness that cannot be filled by anyone else. Whenever we'd have get-togethers, my dad was the life of the party and always knew how to relax everyone. . .and, of course, eventually a conversation about cold fusion or other new energies would arise, sometimes even demonstrations, and the energy level would go even higher! He was a jokester. One of his favorite sayings was, "Beam me up, Scotty. There's no intelligent life here on Earth." He was fun to be around. He had a magnetic personality. His black beard and moustache and sometimes stern-looking expression might have intimidated others, but he was a sensitive, tender human being with an extraordinarily generous heart.

My dad felt extremely bonded to all of his family. He was very interested in genealogy and was always seeking out information about our family tree. He was an only child and a devoted son to his parents. When his parents could no longer take care of themselves, he took care of them without hesitation. When my grandpa passed away a little over a year ago, my dad brought his mom to an apartment right next to his office so he could see her every day, buy groceries she needed, and take her to the doctor. He loved his parents very much and he was the apple of their eye.

My dad loved to learn. This is obvious from his library, which had to overflow into our basement. He had books of all sorts, but found particular interest in things that could not be entirely explained. He was open-minded, using books to obtain knowledge about what he did not understand so he could form his own opinions. He thrived on discussions about these things. In his home office, there is a chair he'd read in and, next to it, a stack of books he was in the process of reading before his death—he was juggling about ten books simultaneously. There weren't enough hours in the day for the amount of reading my dad wanted to do! Stacks of magazines he'd never want to throw away are assembled throughout the room. He just could not get enough information and knowledge. They say the best gift you can give someone else is one you'd want for yourself. Well, every Channukah there were bound to be, among the wrapped-up presents, at least three books for me from my dad. He inscribed every book he gave me—books about September 11, Judaism, U.S. history, cats. . .you name it! I now look at these books, as they sit on my bookshelf, with a new sentimentality.

My dad was a religious man and was proud of his Jewish heritage. As a young girl, I did not like to go to temple, but went begrudgingly to Shabbat and high-holiday services, as well as Hebrew school several times a week. Despite my resistance to going to temple, I do have fond childhood memories of being at temple with my dad. During services he'd wear his tallit and I'd sit by him, playing with the tzittzit as if it was long hair or spaghetti slipping through my fingers. He'd be chanting a prayer along with the congregation and look over at me, raise his eyebrows and smile as if to say, "Don't worry. The service will be over soon. . .It's not so bad after all, is it?" I'd often rest my head on his arm and occasionally drift off to sleep during the rabbi's sermons. To get my brother and me to go to Sunday school, my dad would coax us with a promised trip to Fiske's, a local candy store. We'd always have a Passover seder in our home. My dad would hide the affikomen and I'd be afraid when he'd open the door for Elijah. Years later, I understand how my dad felt about raising his children Jewish because I'll be raising my own children Jewish. I know he was pleased when my husband and I had decided to do so (we are an interfaith couple). When he visited recently, we had some of our Jewish friends over to welcome our baby boy into the Jewish community. I was so glad to show my dad that, despite all my complaining over the years about going to temple, I had



Gene, Joanne, grandson Matthew, and Kim in February 2004.

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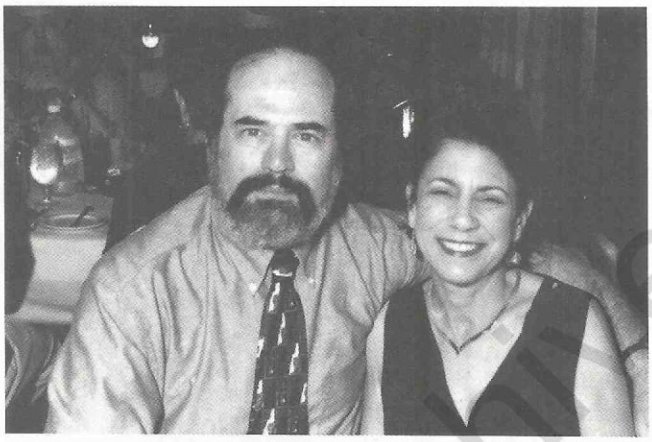
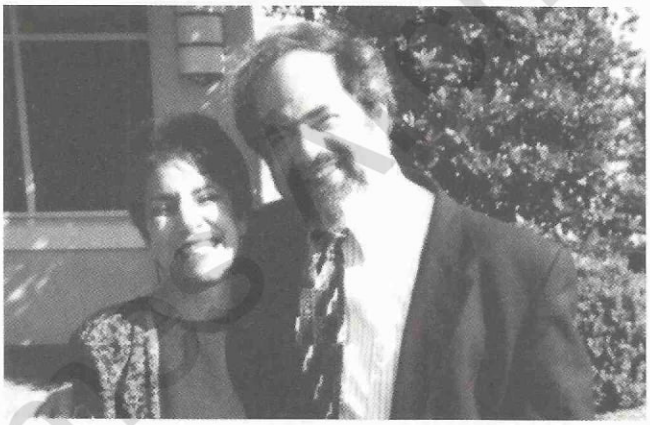
The happy grandparents take Matthew for a walk, February 2004.





Gene and Joanne.

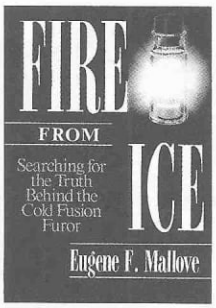
found friends here that would help me to celebrate our religion in a way that was special and that he was right about the importance of being devoted to Judaism's teachings.

Since my father's death, I find myself still in disbelief. He was so full of life. I had just talked with him in a video chat the Monday before his death to show both my parents how much the baby had grown. I keep expecting him to answer the phone with his jovial, "Oh hello, Kim!" or see him walk around the corner with his cowboy hat, rushing off to do errands of some sort, asking me if I needed anything while he was out. My heart aches because I know these things won't happen, but my mind tries to help me cope by keeping these images alive. I'm reading book after book to help ease my pain. I'm desperate to find peace or anything that will allow me to keep on living despite his absence. I gravitate toward books that keep me believing he is in a better place. I like to think he is watching over me, especially when various things during the day remind me of him, like a Willie Nelson song on the radio, a funny joke, or a book I find that he'd like.

I know that if my dad is watching over me, he would wish many things for me in the future. He'd wish for me to keep in close contact with our family no matter how far away they might be. He'd want me to be proud of being a Jew—raise my children to have a bar/batmiztvah and pass on the holiday traditions he and my mom created when I was growing up. He'd want me to follow my dreams and not let anything or anyone stand in my way. He'd want me to take care of our blessing—baby Matthew—and any other children we are lucky enough to have in the future. He'd hope that someday the home I'd live in and the car I'd drive would be powered by clean, cheap, renewable energy; that I'd live in a more peaceful world that didn't rely on oil as its primary energy source. He'd want me to be happy, no matter what that meant, and he'd want me to keep on living as if every day was my last. This is how he lived his life.

I've always been told that the apple doesn't fall far from the tree. Like my dad, I have always enjoyed writing. We both enjoyed a good laugh. People say I have his nose and his eyes. Most recently a friend of mine told me that she saw a lot of my dad in me. She told me she sees his liveliness and zest for life in me. Hearing this brought tears to my eyes, but I can't think of a more meaningful compliment than to be told that my dad lives on in me.

Read the Pulitzer-nominated cold fusion book by Dr. Eugene Mallove:



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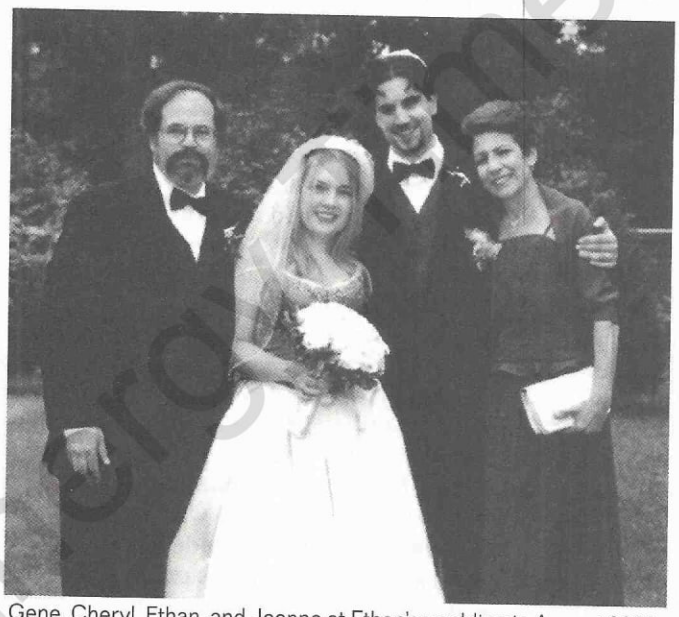
24 Years is Far Too Few

Ethan Mallove (emallove@yahoo.com)

On May 14 I woke up and spent most of the day finishing a take home exam for my Multi-Agent Systems class. I worked most of the day with a couple of guitar breaks. My wife was out with friends for most of the day since I had work to do. I was probably sitting in front of the computer answering a question about Partial Global Planning when 110 miles away my father was being brutally beaten to death apparently over a few hundred dollars worth of his possessions and a tired old 1993 Dodge Caravan. I went to bed and slept fine that night, while at 11:00 p.m. he was being pronounced dead by medical examiners.

My father was the most cautious person I ever knew. He always wore a seat belt, drove the speed limit, wore giant fluorescent orange gloves and hard hat when he cut down a few trees in the yard with a chainsaw, wore a helmet when he rode a bike, etc. He was even more safety conscious about my activities. My friends used to call him a "safety freak." Our family had a joke that whenever I lit a match, for a birthday cake or Shabbat candles or something, there was a predictable "Watch your fingers!" that would burst uncontrollably from my dad. On some days it was a nervous and fearful, "Ethan, be careful with those matches, you're not skilled!" It was this unyielding cautiousness that has made his murder all the more confusing to me. The one absurd contingency that he did not see coming, got him. What a horrible consequence of Murphy's Law.

I do not know if I'll ever be able to sort out why my father died, but it's very apparent to me why he lived. The problem is that I do not know how, in an impromptu memorial, to pay tribute to someone who meant so much to me, was such a tremendous inspiration to me, and who was so supportive and loyal to me. The internal tremors reverberating from this catastrophe make it doubly difficult to coax the words out. I looked up to my father so much. I guess the best I can do is to just recount a few of my fondest memories I had of him and describe the qualities he had that make his departure so tormenting. Trying to relate all of my feelings about him in a short memorial is futile. There's so much to say about him, and words fail in describing what a wonderful and loving father he was.



Gene, Cheryl, Ethan, and Joanne at Ethan's wedding in August 2003.

I'm infinitely grateful for all the audio and video recordings there are of him. I've listened to his voice on George Noory's "Coast to Coast A.M." archived shows several times over, and it's as if he's in the car with me again. His clean, articulate phrases materialize out of the speakers. His voice echoes in my head throughout the day, responding to questions that I might have asked him. I put his intro to the Correas' DVD on today before dinner, and it's like he's in the room again. I'm so thankful to hear from people who were at one time acquainted with my father. Every condolence I've received via the phone, the web, or in person is a real blessing. There are so many fond memories of my dad, I can only hope to recount some of the ones that have surfaced most vividly in these recent months.

We enjoyed many afternoons launching Estees rockets. I can remember the first one we launched. Dad lit the engine with a canon fuse, and ran for cover. I distinctly remember the feeling of awe I was in when it shot up hundreds of feet into the sky. I recently bought an Estees rocket at a hobby shop this past year because I was sentimental over those days with him. One night he explained rocket propulsion to me at the dinner table using a match and a piece of tin foil for a rocket, and a paper clip as a launch pad.

I remember all the amusement parks he and my mom took Kim and I to; there was a trip to Disney World and Land, King's Dominion, Canobie Lake Park, Hershey Park, Universal Studios, and more. My dad would convince Kim and I to go on the scariest rides. I'll never forget the first roller coaster we went on together. As the roller coaster clicked and clacked up to the first summit, I looked over at my dad in terror and he smirked, imitating Han Solo, "I got a bad feeling about this." Just as we would drop down the hill, he would tell me with wide eyes and enthusiasm, "This is what it would feel like to be an astronaut. . . orbiting the earth. . .weightless!"

I remember talks with him after dinner, "pre-1989 Pons and Fleischmann announcement," about his dreams and visions of the human race making contact with extra-terrestrial intelligence, and the history and future of space travel. He clearly had a passion for space as well; the middle name he and my mom gave me, "Armstrong," is a testament to that. There were several 4:00 a.m. Saturn viewings through his Celestron telescope when I was four years old that further attest.

We used to build models of moon landers and Apollo spacecraft and he would explain the importance of each in the NASA program. My father loved building models. He was sort of an old timer that way; he thought the concept of tangible toys was dying and was worried about it. He recently told me, "I remember when you could walk into a toy store and see row after row of model this and model that. . .All

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Gene with his mom, Gladys, at Ethan's wedding in August 2003, being silly in his mom's hat.

they have are video games now!" He told me a few years ago that he still pondered, every so often, going into a hobby shop to buy a model. Model trains, model spacecraft, model boats; you name it. When we had an in-ground pool a few years ago (before my parents built their dream house), he bought a model submarine for their in-ground pool. I can recall the day he excitedly showed me his model submarine in the pool, just like a little kid. That was the thing about him; he never lost his child-like enthrallment with things. I think it was what kept him going full-throttle at all times. He was never bored.

I could not leave out the temple services at the conservative temple in Holliston, Massachusetts, and later the reform temple in Concord, New Hampshire, when reminiscing about old times with dad. And I'm so glad he made me go to Hebrew school despite all my complaining about it. It would not have been as hard had I not grown up in New Hampshire, and been only one of two Jewish kids at school. My dad, for the most part, let me do my own thing and plan my own activities, but he definitely felt very strongly that I attend Hebrew school and get Bar Mitzvah'd.

When I was in elementary school, I sometimes wished my dad was more athletic or more interested in sports, like all my friends' dads. Of course, he could not have cared less! My sister and I would say, "Dad, you're a nerd!" and he would reply on cue, "Nerds make the world go around" and laugh. Nonetheless, he took me to a couple of Celtics games. He, of course, took seriously the educational aspect of attending these—witnessing the sociology of an NBA game first-hand. But once I hit high school, I was behind him all the way on the nerdiness, and was loving it. A few guys I knew were calling him "Huge Euge." One guy in my class told me, "Ethan, I'll never forget the day I woke up to see 'Huge Euge' on 'Good Morning America' [laughs]." A friend of mine addressed him as "Dr. Mallove" on one occasion, which I got a huge kick out of.

He got me into stamp collecting and coins early on. There was a mom-and-pop collectibles store named Vales in Concord that we frequented. "Dad, can we go to Vales?" I would plead every weekend. He showed me his old Indian Head cents, and bought me a metal detector. I was out there in the yard at our old farmhouse in Bow, New Hampshire, digging up lots of old silverware and scrap metal before I called it quits, but we had hobby journals that told stories of people who would find treasure troves. He said when he was a kid he buried a jar of old pennies; it might have been in Norwich, I do not remember exactly. He told me he wished he would have just kept them. I had many fantasies of finding that jar when I was little.

I reminisce about his passion for knowledge. I miss so much getting together with him to see his green van filled with bins of science magazines and various and sundry parts and pieces to a device he had been working on. I would ask him what everything was and he would enthusiastically jump into a performance-style talk about what he was working on. I remember many occasions hearing, "Ethan, if this thing does what I think it does, you are going to see some major, *major* changes in the world. . .you just wait!" And despite the many disappointments he encountered in the new energy field, he remained relentlessly optimistic, and he was adamant he had found proof for the correctness of his optimism. Through all the trials and tribulations my dad underwent over the past fifteen years, I always got a tremendous sense of pride that my father could've made four, five, or "some number" times more than what he was making in new energy research, but chose to explore and search for truth. I never wished he had blown years away doing some "cog in the machine" engineering job for stability's sake. Not for a minute.

My father had a great sense of humor. He always snagged my college science textbooks when I was done with them. When I gave him my Halliday and Resnik physics text he said it was useful for him to get a snapshot of what the going beliefs were in academia. Then he joked, "I'll just go through this and highlight the parts that are wrong, and give it back."

There are far too many classic incidents to list. One of my favorites happened while I was in his van. I had just sneezed, and was searching desperately for a Kleenex. I was coming up empty, when I looked up to see my dad holding a hermit cookie. I looked at him with a quizzical expression, when he blurts out: "Here, blow your nose on this hermit cookie!"

There was an incredibly goofy, squirrely side to dad. We have a video from 1981 of him dancing around to some Michael Jackson song (I forget which one, but it was off the "Thriller" album). He was very creative with his dancing. At one point he grabs an old antique rocking horse, saved from his childhood, and starts riding it. Imagine this 5'8" tall, 170+ lb. man riding a tiny wooden rocking horse, whipping the side of the horse with a green plastic Tinker-Toy!

There were all kinds of odd, quirky things he did, like smush Marshmallow Peeps on the counter as hard as he could before eating them. He had this clicking sound he would make with his mouth. Nobody in the family could do it as fast as he could, and when we tried he would say, "You can never achieve the clicking speed of The Human Castanet!" Our family had a little white dog named Russell (he was a cross between a cocker spaniel and a poodle), whom dad loved, but he really teased the hell out of him. We suspect he was jealous of all the attention Russell got from my mom. Russell was a very territorial and protective

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dog, especially around my mom. There was a constant rivalry going on between the two of them, up until Russell became too senile to get worked up over my dad's antagonistic behavior. "Hey Russell, you think you're frickin' White Fang?!?!" he would jeer, as Kim and I laughed hysterically.

Ironically, he got hooked on the televised O.J. Simpson trial. The sheer absurdity of the whole thing. He would make wry jokes and get really animated about it, picking up a steak knife at the dinner table and saying, "Hmm. . .this kinda looks like an O.J. knife!" Or mock the expression O.J. had on his face when he was fitting the glove on his hand during the trial. He always cracked me up; I'll forever miss his comedy and wit.

I went through a phase in junior high when I was making homemade fireworks. I'm lucky to be alive, frankly! My father was there to not only tell me I was a fool for making them, but also explained the science involved in what I was doing—the thermal expansion and what not. He tried steering my enthusiasm for the fireworks to amateur rocketry, but instead I got into drumming.

There was a period while I was in high school when Chris Tinsley was staying at our house, doing experiments in the basement. I had a band that was rehearsing on the other side of the basement. We put together a raucous metal song about cold fusion. I wrote the lyrics; boy, was it terrible. Tinsley would come over to our side of the basement and say in that great British accent we loved so much, "Well, maybe you can convince Mick Jagger to give you guys a break, eh?" Then we would go over to the cold fusion side of the basement and try to get my dad and Chris to explain what they were doing.

My dad was very supportive. I'm sure he would have liked to have seen me go into science right off the bat, but I decided to go to the New England Conservatory of Music for my first two years of college—the polar opposite to a Bachelor of Science! But he supported my decision whole-heartedly, and he attended every performance and recital of mine that I told him about. He was most proud of the "Taste of Hannukah" and "Taste of Passover" shows I did with the klezmer group in Jordan Hall, mainly because they were shown on PBS. He even brought his elderly parents to that show, God bless him. He loved telling people I had been on TV playing the xylophone. Being an avid country music fan, I'm sure he was puzzled by my interest in jazz. He would routinely tell me to write a country song about cold fusion. Some of my earliest memories are of listening to a Waylon Jennings LP in the living room of our Holliston, Massachusetts home. The nostalgia attached to the Waylon Jennings and Willie Nelson duet recording of "Mamas, Don't Let Your Babies Grow Up to Be Cowboys," which he played ad nauseum when Kim and I were tots, will never fade.

I eventually changed my major from Music to Computer Science, though I had been enthusiastic about his magazine and research all through my time in music school. I suppose it was a mixed blessing that I had that mid-college crisis five years ago, which landed me back home for a year. I saw a lot of my dad that year, thank God. He would show me around the office and the lab. I never had enough physics to get deeper than the outer layer of the research he was doing, but it was always inspiring to see some new device he was testing and his intense enthusiasm for his work. With engineering school came far fewer visits to my folks' home, but my dad and I had the type of relationship that disregarded hiatus. It could've been many months between visits, but when I saw him it was like we had seen each other the day before.

I admired his intelligence. There was not a topic I felt we couldn't chat about. We had long, extended conversations about world history, biology, religion, politics, and fill-in-the-blank that would go on for hours after dinner. He even had input on my Jazz Performance studies. He once asked while we were listening to John Coltrane in his famous green van, "What is it about jazz you like?" There was really nothing you could say to someone so enamored of country music. I will forever miss hearing my father's voice, his energized enthusiasm for science. I was always so amazed at how he could expound on something verse-after-verse without a vocalized pause or a stutter. I truly hope to see some of the visions and hopes he had materialize someday.

Since my grandparents played such a big role in my upbringing, it's excruciating to think of what my children will miss out on with my father's premature passing. I remember so vividly visiting my dad's parents, Gladys and Mitchell, in Norwich, Connecticut, and later in New London, Connecticut. This large store of Norwich memories have been stained by my father's murder on the site of these memories. Kim and I would always talk about how safe we felt in the 119 Salem Turnpike house with the hush of cars passing on Interstate 82. I distinctly remember arriving at my grandparents' home to be greeted by a table of every imaginable food; never was there a square inch of table cloth exposed beneath the layer of plates of macaroons, hard boiled eggs, lox and bagels, etc.

Joanne, Gene, Gladys, Mitchell, and young Ethan, circa 1989.

I'll always remember the dynamics between my grandpa and dad. The dominating tone of my grandpa as he would drive his old blue Pontiac as my father would try to yell over his voice, "Daddy, there's no time to go to the aquarium today." "Eugene, you listen. . .we are *going* to the aquarium!!" My dad would always chuckle at Mitchell's mannerisms. Mitchell, like my father, loved giving data about anything he drove by. If we drove by some historic monument, grandpa had a ten minute narrative for it. The dinner table was always the most hysterical, with my grandpa trying to get me to eat as much a variety as possible from the buffet. Every visit to grandma and grandpa's included a visit to The American Steakhouse, and it was there that my grandpa would routinely be frustrated by the lack of food variety on my plate. He would lean over the table adjusting his glasses and softly say, "Because you do not know exactly what your body needs, it's best to have a variety," as he scraped a pile of fruits and veggies onto my plate from his. At some point, my dad would interrupt and say, "Now Daddy, please. . .enough.

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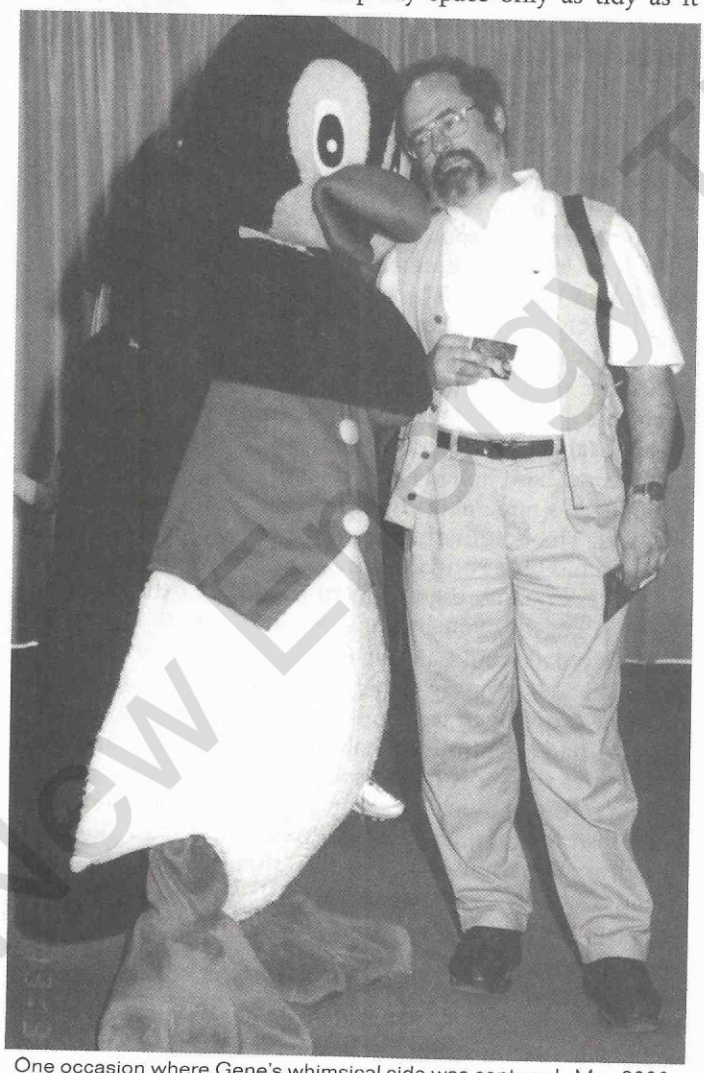
He just wants his hamburger and French fries."

There were lots of similarities between dad and grandpa, Mitchell. One of the salient ones was the inability to throw anything away. This was certainly part of the Mitchell Mallove legacy. Although, my dad was more discriminating than Mitchell; we never did have jars of nails and wingnuts lining the garage as grandpa did. Science magazines and books were probably dad's favorite collectibles. I think he wanted to preserve snapshots in time; he liked looking through old notes he had taken. There's a big box of his small spiral bound notebooks, which he carried around 24/7, that I still need to go through. He loved videotaping and photographing get-togethers and family reunions. I wish I had spent more time behind the camera photographing *him* all those days.

He had a funny system of paper and magazine piles in his office, because they all could not fit on his bookshelves. Pile after pile they lined most of the floor, save for a small foot-wide path to his desk. "They're in piles, but they're neat piles. I know where everything is in here," he would say if someone moved a pile or criticized his style. "A clean office is a sign of a sick mind," he joked with me recently. Our basement still has many a bookshelf of science magazines; it's unbearable to think about the possibility of throwing even a single one of them away because I know how much he valued them. For better or for worse, I've adapted his philosophy on orderliness. I keep my space only as tidy as it needs to be, no more and no less.



One occasion where Gene's whimsical side was captured—May 2000.

He was always taping TV programs and cutting out news articles that he thought I would be interested in. He would send photocopies of articles on a monthly basis with topics ranging from medicine to computers. One that stands out in particular was "Triumph of the Nerds," a documentary on the personal computer revolution. It ended up playing a role in my change of focus to Computer Science. He loved learning about computers, though I think he was frustrated sometimes that he got behind in all of it. "Whatever happened to the days when you could look in the paper and see real engineering jobs. . .I open the Help Wanted section these days and all I see is a bunch of computer jargon intermeshed with unintelligible acronyms. . .BX3 software design position. Skills needed in RX-458EE, SWQ-98, and BVCFF on the 34Q platform essential," he would kid. He got quite a kick out of the dot-com hysteria. "Did you hear about Johnny down the road? He's in fourth grade, and he's the CEO of a dot-com!" he would joke. He had great stories to tell me about his days programming giant mainframes with punch cards. I was so proud to tell him that I had got my first programming job last summer, and was anxious for him to see me finally complete my Computer Science degree this December. Although, he always warned me about the pitfalls of a 9-to-5 engineering lifestyle. I was looking forward to having long talks with him about computer technology. His excitement when he brought home a scanner with OCR software included was a classic dad moment; this typified his perpetual engrossment in technology. Whatever his new toy was—digital camera, large screen TV, or palm pilot—he showed it to me like a kid in a toy store.

Early on I observed how my father's level of enthusiasm for his profession was so extraordinary in comparison with everyone else I saw; I knew he was very special for this. He thrived on the feeling that his work could open the way to a different and better world. That was notable; I never saw him livelier and happier at work than when he was doing *Infinite Energy*.

I wish I had had a chance to tell him, before he left, how special he was to me. How he really was my best friend. A few times, over the past few years, he told me that there was so much to the human body, the brain especially, that science could not explain. This has left me with hope that he exists somewhere now. I pray I'll someday see him again so that I can ask him all the questions I'll never get to ask him, tell him all the things I didn't get to tell him, and show him all the things I never had the chance to show him while he was here.

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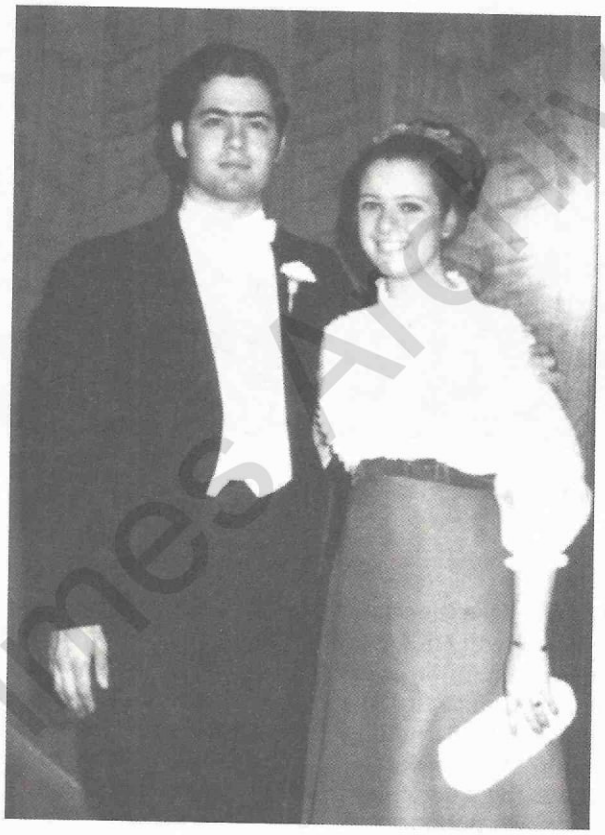
Eugene Ma-Love

Jana Goldstein Scher

Young playmates Gene and Jana, in about 1952.



Gene and Jana in their teen years, about 1964.

What an honor is bestowed upon me to be writing a short story about my memories with my dear cousin Eugene.

Whenever I think about Eugene, my heart feels such love and affection, such an amazing amount of joy. Some of my fondest memories ever are those many wonderful occasions spent with him. We were only a year apart in age, so we had many things in common. We loved the beach, the scariest and most adventurous amusement park rides, playing practical jokes on each other, and family outings and parties. We also both played the piano and loved music. We could spend hours listening to music, especially The Beatles. I still remember how he loved that song "Norwegian Wood." And I know we both felt that we had the best family ever. I was related to Eugene on his mother's side. His mother and my mother are sisters. We were very close to our aunt Rosalyn, who we all considered the matriarch of our family, especially after our grandparents had died. I would be totally remiss if I didn't mention how very close Eugene and I and all of our cousins were to her. She was a major influence on us in our childhood and our early adult years and we always remembered her so fondly and lovingly.

There was no question about it. Eugene was just incredibly special to me. I always looked up to him and felt he was more like an older brother than a cousin. And we always seemed to just look out for each other. I always thought that was so sweet. It was his quick wit and humorous side, along with his gifted brilliant mind and sparkling good looks, that always made me so proud to be related to him. As a little girl I was secretly in love with him and used to call him "Eugene Ma-Love." He would say, "Don't call me that; I don't like girls." Well, that would change soon enough. Fifty years later he would confess to me that even as a little boy he loved me too.

As we got into our teenage years, he would come to me for advice about girls. I used to think, "Wow, my super smart cousin Eugene actually wants advice from me!" And when we were thirteen we actually practiced kissing so we would be prepared when we started dating. Some years later we would sit outside my college dorm in Boston talking about our trials and tribulations with the opposite sex.

Then he met Joanne and fell in love with her. The first time I met Joanne, I knew she was a perfect match for Eugene and I told him so. I was so happy and relieved that he found someone so special. I have always felt an incredibly special bond to Joanne as well. I would like to thank her so much for the great happiness and love she brought to Eugene every day of his life. I am so grateful for that.

I realize now that over the last thirty years or so Eugene

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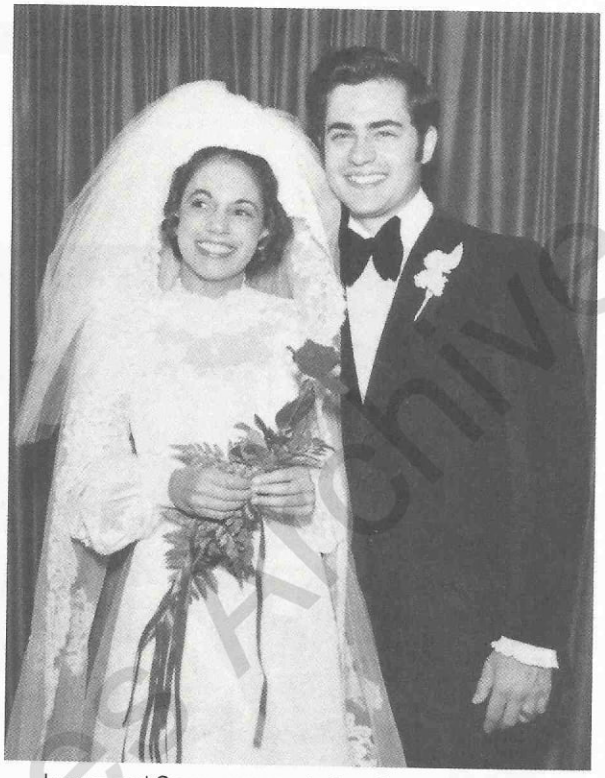
Joanne, Gene, Joanne's mom Josephine, Gene's aunt Rosalyn, Jana's mom Shirley, and Jana in West Hartford, Connecticut, about 1971.

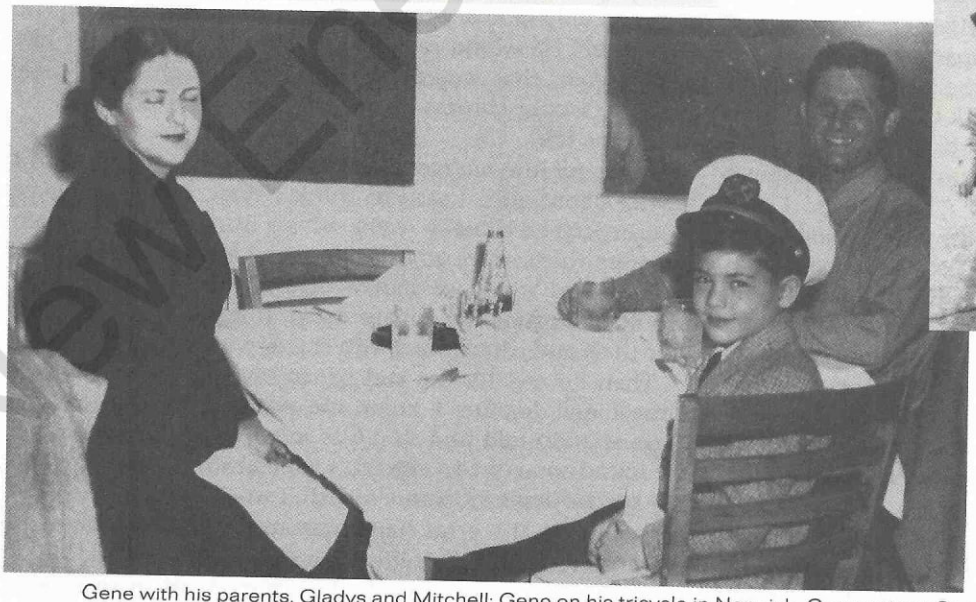


Joanne and Gene were married on September 9, 1970.

has really been the patriarch of our family, always communicating with all the cousins about the latest Mallove news events. We heard with endless energy about cold fusion and the excitement when he published his books. He was so dedicated to making cold fusion a reality for the good of all mankind. We also know he had his frustrations with his career. With all his brilliance and ability from the time he was a very young man, he never once wanted to work or be involved with anything that would be harmful to the earth. He struggled so much to find a way to make the world a safer and better place. Eugene Franklin Mallove was a true humanitarian, a kind and giving soul.

It was the saddest day of my life when Eugene left us. Words cannot describe the oppressive grief and pain I feel not only for my own personal loss, but also for his dear family, friends, and the whole world. This is a tragedy of incredible proportions for us all! I pray that somehow, someday Eugene's dreams will be realized. I know for sure that I would do anything to see that happen. For now I would like to stay close and involved with Joanne, Gladys, Kimberlyn, Patrick, Matthew, Ethan, and Cheryl; that will give me much happiness. I know, with all my heart, my dear, sweet Eugene would be happy knowing that we are to remain close. God bless the memories of our beloved Eugene. He will be forever in our hearts and souls.

Gene's Early Days



Gene with his parents, Gladys and Mitchell; Gene on his tricycle in Norwich, Connecticut; Gene's grammar school days.

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My Unexpected Challenge

James P. Kornberg

Sitting here in the quiet comfort of my Colorado home, at my usual working hour of 2:00 a.m., I am confronted with one of the most unique and painful personal challenges of my 57 years of life—namely, trying to convey to the undoubtedly broad spectrum of readers, the enormity of the loss of my dear, dear friend and colleague Eugene Franklin Mallove.

It is most unfair that I am faced with this challenge. I resent this task. I despise those responsible for depriving me of one of the most authentic joys in my life—embodied in the personage of Gene, our camaraderie, the mental stimulation of our interactions, and the brotherly love and mutual respect that had taken the largest part of a lifetime to nurture and to build.

Among all of the persons that I have had the privilege to know or, yes, even to know of during my entire life, the wrenching of Gene from the living is probably and personally, without question, the most unfair. I make this assertion, considering all factors, namely, his youth, his closeness to his family and friends, and his *importance* to the world and the community of mankind. The first two factors are often operative in situations like this tragedy. It is foreseeable and expected for any of us to cherish those close to us who die young. This last factor, however—his universal importance—is reserved for only a handful of persons and, certainly, has never applied to anyone that I have ever known in my life, thus far, under even remotely similar circumstances.

So, given the above, how can I meet this outrageous challenge? I can spend some lines (and I will) persuading my fellow readers of the magnitude of this personal loss to me—the loss of a very close friend and colleague, the kind that, if you are lucky in life, you can count among those numbered on one hand, or less. To persuade you regarding the universality of this loss may be more difficult, unless you are knowledgeable in matters related to the course of human technical evolution. Here, I am confident that whatever I have to say will be bolstered significantly by the statements and the testimonies of many others, possessing far greater expertise than I.

Since 1968, I have shared virtually every important event in my life, both good and bad, with Gene—weddings, births of children, scholastic training and achievements, illnesses and demise of parents. Gene and I met in our sophomore years at MIT. We majored in the same subject, Aeronautical and Astronautical Engineering, took mostly the same classes, and endured the same challenges through both our bachelor's and master's degrees at the "Tute." We even enjoyed the punishment of the same lab during our graduate work, both winning NASA Research Fellowships in those days of "Apollo." We even wrote our first technical paper together, flipping a coin to see who would be first author. Gene and I were both invited to accompany our professors to witness the launch of Apollo 10 in May 1969, that dress rehearsal for the lunar landing in July of the same year. On that trip, I recall an event that brightened Gene's smile almost as much as the lift-off itself. In a free moment, while beach-combing, Gene rushed up to me declaring, "Look what I found!" Carefully, brushing off the wet sand, he held high a perfectly fine watch in mint condition. Little did I think that I would spend the next two hours trailing behind Gene, as he located a police officer, filed a report, and stood in line at two nearby hotels trying to locate the watch's legitimate owner. Lucky Gene, after four weeks, while back in Cambridge, he was awarded full custody of the watch by the local police jurisdiction. Gene was particularly taken by the "Twist-O-Flex" band on this treasure. Absent this effort, Gene would not have been able to enjoy this watch. Now, Gene didn't fool me in the slightest. Yes, when one combines character and honesty with a complete mastery of the mathematics of probability, you have Dr. Eugene F. Mallove, who knew that the probability of easing one's conscience and keeping the watch were each, nearly, 1.0 (100% certainty) on that day in May, 1969.

Gene and I both left MIT to pursue our doctorates at that "easier" school down Massachusetts Avenue, Harvard University. We both ended up in the Environmental Health Sciences and Engineering Department in Harvard's School of Public Health in Boston. Gene and I worked in related fields for a few years and, then, our careers started to diverge. I, insanely, went on to medical school and Gene stayed true to the course of science and engineering. He would never let the spark of pure science dwindle in his thoughts and action. Forever challenging the status quo, Gene applied his monumental mind and training to everything he touched for the next, nearly, 30 years. Gene combined an outstanding ability as a writer to develop his skills as a science journalist. From top positions at the Voice of America (where he once up-linked me by satellite from Denver to discuss the carcinogenicity of Russian "spy dust") to his faculty and Chief Science Writer positions at MIT (where Nobel Laureates were at his beck and call), Gene performed brilliantly.

His life and career turned on a dime with the advent of cold fusion. This story is way too long to tell here, but suffice it to say that after Gene completed his Pulitzer Prize-nominated book, *Fire from Ice: Searching for the Truth Behind the Cold Fusion Furor*, he became a believer. Gene left MIT, partly because he concluded that our old alma mater had not treated this new subject in a manner consistent with the dignity of the institution or, for that matter, in a manner befitting honest scientific investigation.

By now, I think that it should not surprise you to conclude that whether entirely right or partially wrong, Dr. Mallove was a man of exceptional scientific training and intuition, who would not have thrown away his career for nothing. Gene's embarking upon the establishment of *Infinite Energy* Magazine, in conjunction with his other endeavors, was one of the most profound acts of self-sacrifice for one's beliefs and principles that I have ever even read about, much less witnessed first hand, up close. I predict that

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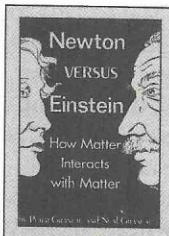
the history of science will someday recognize this act of brilliance and bravery and that Gene will take his place among the giants of science.

For over a decade and at an increasingly faster pace over the last five years, Gene, more than facilitating the creation of a literary cross-road for new energy investigation, became the human manifestation of this goal. No single person had a more complete understanding of the "field," its strengths, weaknesses and limitations than did Gene. His enthusiasm was legendary and according to some, blinded his objectivity. Nothing could be further from the truth. I personally witnessed Gene's defusing and rejecting of bad science, bad instruments, bad ideas, and, yes, even bad people. His adherence to the scientific method can be seen again and again in his editing of and contributing to *Infinite Energy* Magazine.

Gene will never be replaced. Our only hope is that the New Energy Foundation (NEF), which Gene helped to establish and for which he served as President, will find one or more persons who, collectively, will be able to maintain the momentum of Gene's ideas and goals. This objective will take some time, patience, and continuing commitment by all of NEF's supporters.

My personal loss, as significant as it is, pales in comparison to the pain suffered by Gene's wife Joanne and his wonderful children, Kim and Ethan, and their wonderful families. They have lost a husband, a father and, yes, even recently, a grandfather. I witnessed solidarity and love before, during, and following Gene's funeral. His family will survive and will gain strength; but they will never, nor should they ever, fully recover from this hideous loss. I will never recover from this hideous loss. It will haunt me for the rest of my life.

I trust that I have established the foundation for my assertion that the murder of Dr. Eugene F. Mallove is a crime against humanity. It is not clear whether or when this scientific field will recover from his loss. Gene's articulate persistence in trying to obtain major funding for new energy research had not yet paid off—but, if anyone had a better chance of success, it is not clear who that person may be or may have been. The long-term payoff, as Gene often said, will be the end of the "Fossil Fuel Age," a goal universally desired by persons of reason. No one, including Gene, will or would have expected to see a "cold fusion-powered car" or home heating system operated by a cold fusion heating unit within the short term. What Gene desired, instead, was a meaningful financial commitment to study these new phenomena, to dissect them and to identify the physical principles upon which they are based. Achieving these goals will lead to the reproducibility demanded by all. Bench-scale devices lead to pilot plant machinery which, in turn, will lead to the production of commercially viable products. These products will not require fossil fuels. Our political and economic enslavement to undemocratic and wicked regimes will end. Gene's dream of "infinite energy" will be realized. Would that he had lived to see it come to pass. We all have a shot at witnessing "Gene's Dream." If we collectively try to push as hard together as Gene could push alone, we may witness it for him.



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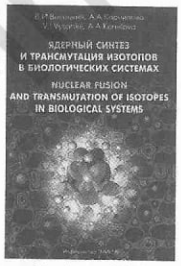

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Of Flying Pigs and Starry Skies

Christy Frazier

My experience at *Infinite Energy* has been unique and invigorating, which began the very day I met Gene Mallove for the first time, at my job interview. I had already interviewed with then-Managing Editor Barbara DelloRusso and taken home copies of the magazine and Gene's book, *Fire from Ice*, for reference. I expected it to be the most nerve-wracking interview of my life—I dislike interviewing to begin with, but this was the first time I would sit down with a Ph.D. (and published author) who would decide whether to hire me. It is a testament to Gene's character—his caring way, genuineness, and interest in all people—that the interview was the best one I've ever had. What began as nervousness quickly turned into ease and comfort as we spent over two hours discussing our love of books and movies, compared our New England upbringings, talked about the health of our parents, etc. We covered topics from popular culture to politics, and of course I got a tutorial about cold fusion. When it was over, I was not only confident, but hopeful, that I would be offered a job. Two weeks later, I began work with *Infinite Energy* and have since found more professional satisfaction than I have experienced anywhere else; I owe much of that to Gene.

It has been a challenge and joy to work with Gene these past six years. Never once did I feel unappreciated or disrespected. My opinion always mattered to Gene; believe me, I usually shared it on all subjects, but it was when he would come to me for my opinion that I would realize that he treated his employees like partners in this business. Gene's open-heartedness and generosity as a boss and as a friend cannot be equaled.

When you share so much of your day and your world with someone, it is impossible not to love them. Most people I know cannot say that they even like their boss all that much, but I am proud to admit that I loved Gene and knew what it was like to be in his care. When you knew Gene well, you were in for many surprises. He copied articles on subjects he knew you were interested in, he asked your opinion on the latest fads or supernatural incidents, he was always generous with his time and energy. He treated you to his unique sense of humor, his happy dances, his short fits of anger that always ended on upbeat notes (I'm not kidding—he could take the worst situation and put a happy spin on it). But even those who did not know Gene well were offered his utmost attention. Perhaps one of the most telling signs of Gene's goodness was how he opened his heart and mind to strangers, offering them information and knowledge and always listening to what they had to say. He was one of the most generous people I have ever had the pleasure of knowing and caring about.

Gene had an affinity for artwork or images of flying pigs. Someone once likened the possibility of cold fusion to the likelihood that pigs will fly, and ever since Gene has collected these bovine beauties. I would roll my eyes and giggle anytime he bought or found a new flying pig. They were not easy to find either, so he always had such glee on his face when he showed off the latest one. Until Gene's death, I never once saw a flying pig for sale anywhere. But since May 14, on about ten occasions I have seen some amazing examples—not the pink hanging versions or photographs he would find, but wrought iron pigs with wrought iron wings, colorful kites, and other interesting types.

I always joked with Gene that he was just old enough to be my father. But he was certainly too young and too full of life to leave us so soon. When I look to the starry sky these days, I have different thoughts and emotions than I used to have. I take comfort in knowing that the seemingly endless sky that Gene loved so much rests above us, as though he is looking down to us and will help guide the way. I don't believe in a literal place called Heaven, but these days I hold tight to the idea that Gene's spirit is bouncing about the night-time sky. In the way that only Gene's positive-thinking soul could, he is surely reveling in the chance to explore the universe in a new way.

Memories of a Colleague

Barbara DelloRusso

I met Gene for the first time in December of 1997. The *Infinite Energy* office was, at that time, located in a small warehouse. Technical equipment and bookcases of magazines were everywhere, and an "office" was located somewhere in the middle of it.

Gene struck me at that time as being dynamic and extremely focused. He was sensitive and had great insight to the future of this world. He was truly interested in what my pursuits were—and he gave me my first overview of what his journey was all about. Before the second interview, I had read many of the magazines, as well as his book, and clearly hoped that he would choose me to help him organize the many areas he was trying to pull together.

I could tell immediately that working closely with Gene Mallove would truly be a challenge and an incredible learning experience. Anyone that has worked with Gene knows that his presence was one that gave you incredible enthusiasm for whatever was at hand. His kindness, his interest in so many areas of science, and his wonderful laugh and smile will never be forgotten. Memories of working closely with Gene on special issues, a growing staff, office, and laboratory, and his incredible outlook and determination for the pioneer magazine to be open to new ideas always brought something interesting to a typical working day.

Gene was so expressive, and I will never forget his joys when something good was about to happen or did happen. One time in particular, he just ran down the hallway and kicked up his heels. One time he brought his accordion into the office and played. There were many late nights when the magazine was dealing with deadlines—and there would be country music flowing down the hallways.

I continue to consult with the magazine and had just spoken to him several days before he died. He was animated and excited about *Popular Mechanics* doing an article, as well as the new developments with the Department of Energy taking a second look at cold fusion. Gene devoted so much of his life and his energy to this scientific frontier. I believe he *will* see the breakthroughs. . .and will know that his determination, open-mindedness, and spirit will live on forever and be a continued catalyst for future experimentation.

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Homage to a Peerless Friend

Paulo and Alexandra Correa

"I am quite convinced now that CF will *never* be explained by standard quantum mechanics and relativity—and those are precisely the two theories on which 99.99% of cold fusion theorists rely. Thus, cold fusion has a *big* problem. It cannot explain what BlackLight power is seeing and it cannot explain what the Correas, Tesla, and Reich see and saw." —Dr. E. Mallove to Steve Krivit, 7/8/03

"Please get used to the idea that *Infinite Energy* will be increasingly exploring the relationship of other anomalous physics phenomena and will be attempting to relate them more directly to LENR. I have done quite a bit of that already. I view it as a service to the field." —Dr. E. Mallove to Edmund Storms, 3/29/04

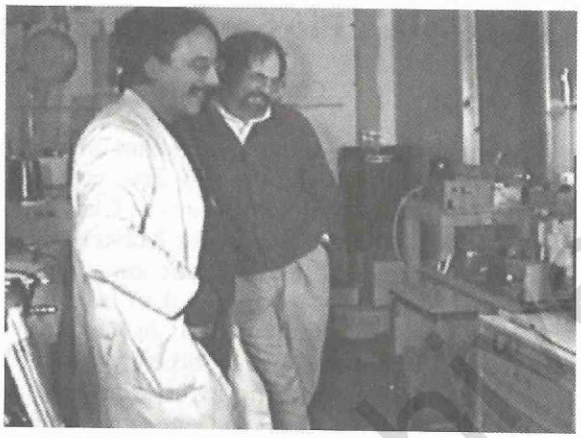
"All particles are made of Aether, they are not little hard things, they are—the things that we call particles today, electrons and protons and so forth—nothing but special geometries of the massfree Aether that are in a form that makes them have an inertial quality—in other words, makes them have mass. . .Some people have called the [vacuum] energy. . .zero-point energy. I don't believe that that theory, the zero-point energy theory, is the proper Aether theory." —Dr. E. Mallove on the G. Noory show, 2/2/04

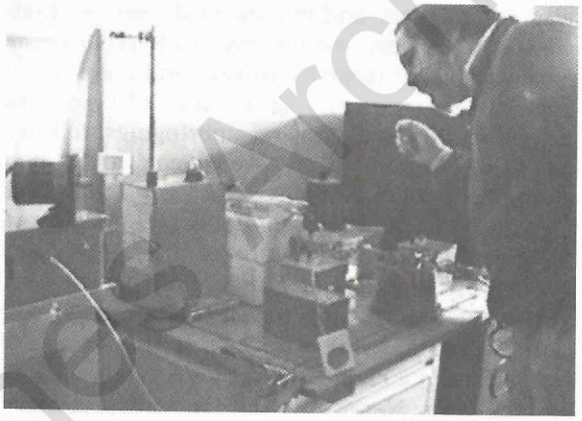
"The energy source is: 1. *Not* LENR or cold fusion reactions; 2. *Not* capture of *sensible heat* from the environment; 3. *Not* Puthoff *et al.'s* "ZPE"; 3. *Not* Mills' hydrinos; 4. *Not* from "dark energy" or "dark matter." It is ultimately from *massfree* aether (the non-inertial "substance" from which all inertial matter—and all electric "charge"—ultimately derives and is composed). In order to study this energy source, one must carefully resolve the very real anomalies that have been described by the Correas (building on the work of Wilhelm Reich). . ." —Dr. E. Mallove in an open letter to scientists and the public, 4/11/03

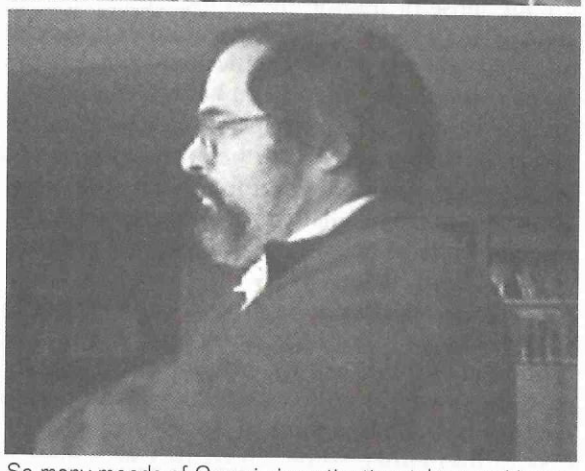
"Modern thinkers considered it unnecessary to perceive reality and modern physicists considered it unnecessary to think." —A. Rand, *Atlas Shrugged*

This is undoubtedly the most difficult piece of writing we have ever had to compose. We simply cannot adequately express in words the loss we mourn of an extraordinary man who was our very dear friend, collaborator, co-worker, accomplice in intellectual and scientific combat, and fellow scientist.

A beautiful family has lost their tender, generous, and dedicated father and husband in the most brutal manner imaginable. Modern-day America has lost the brightest, most courageous and open-minded physicist it had. The State of New Hampshire has lost one of its foremost citizens, a guiding libertarian and a courageously combative spirit. The State of Connecticut—and the town of Norwich in particular—has lost one of its most illustrious children, a passionate opponent of unbridled development and land speculators. The State of Israel lost its most disinterested defender, one who—to no avail and despite so much wealthy Jewish-American capital vowing to help make Israel independent from the politics of Arab oil—ceaselessly attempted to provide it with the hope and means to achieve energy self-sufficiency. MIT, his alma mater, has lost one of its best and most honest pupils, a man who sacrificed his own career and supposed best interests for the sake of scientific facts and personal integrity. The cause of low-energy nuclear fusion has lost its most ardent champion, one so dedicated that he never gave up the fight wherever it led. Serious researchers in alternative energy sources have lost their bulwark, their defender and promoter—one who worked tirelessly to separate the wheat from the chaff, actual science from good faith error or dissimulated fakery. This maga-







So many moods of Gene in investigation: joking and laughing relaxedly, carefully examining the Aether Motor or the Orgone Accumulators, being pensive and attentive when testing the biological field meter, all in November 2001.

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zine lost its living soul, the well of its infinite energy, its creator and animator. The science of the New Aether lost its greatest friend—one of the only scientists that gave serious consideration to "vacuum" energy and managed to *not* reduce it to the tired mainstream notions of a ZPE.

And we lost our dearest friend, our collaborator and ally in the aetherometric project, who reviewed all our writings and was privy to all its secrets, the only physicist sufficiently trustworthy to be introduced to the innards of our Aether/Orgone Motor.

A couple of years back—and again last summer—Gene told us of the two events that, in his life as a scientist and in his deep bond of friendship with us, had marked him the most. They are also two of the memories we cherish the most. The first was the occasion when Paulo made his acquaintance. It was at the 1996 Denver conference—when Paulo gave, at the request of Stefan Marinov, and in the presence of Harold Aspden, an *ad hoc* mini-presentation of our lecture in a room adjoining the main hall. Marinov could not believe that our work effectively disproved his own theory of electrodynamics and instead confirmed Aspden's 1969 model. Hearing the heated argument, Gene stepped in and asked for yet another replay. His enthusiasm that day led to the first issue (#7) that *IE* dedicated to our work. It was with glee that, last year when we were in New Hampshire to visit him, he showed us the giant poster he had made of that *IE* cover which he had hung on the wall to the right of his office desk, stating that it gave him satisfaction to know we were, since that day, "always there" with him. And we, too, for so many years now had come to feel that no matter what we did, where our work led, or when there were strategic decisions to be made in our lives and work, Gene was always here with us.

The second event, Gene recounted, was the day he first saw the Aether/Orgone Motor in action in our ABRI laboratory—an occasion that was repeated three times more over the next few years. He told us of the deep satisfaction it gave him that he now knew for certain that what he had been looking for all of his life was no longer just a certainty, but a reality. This prompted him to learn about W. Reich and N. Tesla, and his enthusiasm was so contagious, and his indebtedness to his benefactors so deep, that he asked us whether he could invite his main sponsors to witness it—one who could not attend, apparently for health reasons, and another who, along with a colleague, witnessed it sometime later.

A year ago we reminisced together about these two memories, now engraved forever in our hearts. Gene had bought a large screen display, and recounted to us how he and his wife Joanne had watched with joy the video that we had prepared for Aethera at his request. Gene's nimble intelligence and generous heart, his complete open mindness, were so gratifying to us that we had, by then, revealed to him the innards of that Aether Motor—something we have never done for any other human being or any other scientist that has witnessed our demonstrations. That is just how special Gene was to us. Those who have watched the Aethera video will well remember his high-spirited reaction at finding out that the transmission of massfree electricity by body contact gave rise to the curious sensations of tickling and prickling. It was such a delight to hear his excitement and wit, that even now its memory obfuscates the grievous pain and anger that his untimely death has caused in us. When, after so many attempts to find a serious sponsor for our work, we came upon a candidate who had the same name as the leader of the pack in the last of the "Planet of the Apes," on the same day that he had watched it, Gene cracked that, in this case, there wasn't even a need for trying. When he took us to eat lox and cream cheese at Einstein Bros. Bagels in Concord, New Hampshire, he joked something to the effect that, "this is what happened to Albert when he realized relativity had failed."

We are now in a remote place, contemplating John Galt's decision (see Ayn Rand's *Atlas Shrugged*) to stop the motor of the world by way of a brain strike—alone with our thoughts, our memories, our sadness and anger, contemplating a vast crystalline sea, in search of what Gene called "a bit of paradise" that he had wanted us to find so that he and Joanne could come and spend some much-needed quiet time with us. Gene's excitement with the thought that, despite all failed attempts at finding sponsors, we would still rebuild ABRI from the ground up as a community of scientists, artists, and thinkers, is still with us. We fear that, with the loss of Gene, this will now never happen. But if, by an unexpected quirk of fate, it does, then it will be because somehow we will have found, once again, what he called "the Grand Mallovian Spirit" on this sorely tried planet.

Rumors have always, it seems, circulated that Gene had some commercial arrangement with us. Nothing could be further from the truth. This dear friend traveled all over this continent on educational missions and in search of sponsors for our work at Labofex and then at ABRI. He took upon himself to learn the new physics of the massfree Aether, became a member of ISFA, and moved on to study our unpublished work in nanobiology and oncology. He never asked a penny in return, never hesitated to spend his own funds in his search, no matter how difficult it was at times for him. And it was. He was willing to contemplate taking up the selling of real estate, or teaching as he had once done, or even serving tables—as he sometimes threatened—if only he could continue to search for sponsors for our work and for his newly-formed NEF. Gene's overriding scientific interest is only too often subsumed under the rubric of cold fusion, or grossly reduced to it. Nothing could be further from the truth. He had concluded, in fact, that a solution to the energy problem could only come from an understanding of Aether science and technology, such as we have proposed; that this alone could shed light on the problem of "cold fusion" and lead not just to a resolution of the impasse the latter is in, but well beyond it, to other power technologies that did not employ nuclear processes, such as he witnessed time and again in our laboratories. Thanks to Gene's determination, we are proud that we can no longer claim to have never been sponsored by anyone, for this past April we received from NEF the first and only grant that our work at ABRI has ever received (and not at Labofex, as was mistakenly reported), for our study of the alteration of the half-life of beta emitters. Gene so much wanted to have been the one presenting it at the upcoming ICCF11 in Marseilles. His support for our work cost him many false friends and provoked countless attacks by lesser scientists and muckrackers from many quarters, yet he never once wavered. A good fight, said Gene, always made him stronger. Our indebtedness to this extraordinary human being is so great as to defy reason and sensibility. Neither the incalculable contributions made by

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Gene and by Dr. Rui Silva, Uri Soudak, and Dr. Malgosia Askanas, nor our gratitude to these dear friends can be measured or described in words. They have made it all worthwhile, both the good and the bad. And for as long as we shall live, Gene will be in our hearts.

Despite all of Gene's efforts, our own efforts, and those of our friends, we have not, in over twelve years of searching, found a single intelligent, committed sponsor. We suspect that the truth is that which Ayn Rand described so aptly in *The Fountainhead*:

> The first campaign of the *Banner* was an appeal for money for a charitable cause. Displayed side by side, with an equal amount of space, the *Banner* ran two stories: one about a struggling young scientist, starving in a garret, working on a great invention; the other about a chambermaid, the sweetheart of an executed murderer, awaiting the birth of her illegitimate child. One story was illustrated with scientific diagrams; the other with the picture of a loose-mouthed girl wearing a tragic expression and disarranged clothes. The *Banner* asked its readers to help both these unfortunates. It received nine dollars and forty-five cents for the young scientist; it received one thousand and seventy-seven dollars for the unwed mother. Gail Wynand called a meeting of his staff. He put down on the table the paper carrying both stories and the money collected for both funds. "Is there anyone here who doesn't understand?" he asked. No one answered. He said: "Now you all know the kind of paper the *Banner* is to be."

And now we know how shockingly clear Rand's insights were in this respect. Gene was perhaps the only publisher/editor of an eclectic technical and scientific journal who refused this pervasive logic of populism, never allowing *Infinite Energy* to become either a peer-reviewed dead-and-dried journal nor a popular magazine—*Banner*-style—that would feed on sensationalism and pseudo-sociological claptrap. And though his tireless efforts to obtain needed funding seldom paid off, he never stopped trying—any more than he evaded the political nature of the funding problem encountered by forefront scientific research in alternative energy sources:

> Seriously, money is indeed a choking point. I don't want to be crass about it and say: look, send money, this will solve the problem. We still have issues that won't be solved, but believe me, these cold fusion researchers, and the BlackLight Power Corporations of the world, and the vacuum-energy people that I'd like to talk about soon, the Correas in Canada—Toronto, Canada—they're basically starving for money for the kind of work that could take us rather quickly, in many cases, particularly in the vacuum-energy area, from no visibility to extreme visibility. . . That's why, my good friends, we need—for the New Energy Foundation, and for many other people—we need the research funds. That's the choke-point. You cannot expect this work to go ahead for free. It won't happen. It just will not happen. And I know that the New Age people and the groupies—of many of your other wonderful programs—may think that this is just gonna happen by osmosis and the reason it's not happening is because there must be something wrong with the theories and the experiments. Not true. There is nothing wrong with the theories and the experiments. But there is everything wrong with the fact that there isn't enough money in this field, and the New Energy Foundation hopes to change that." (Dr. E. Mallove on the G. Noory show, last February)

For the past fifteen years, Gene single-handedly drove a relentless combat against the hot fusion establishment, against the murderous politics of oil, and against the fears and pettiness of conservative physicists in the CF/LENR field. From his courageous exposure of the lies at MIT in the early days of cold fusion, to the inception of *IE* with his dear friend Chris Tinsley, to his commitment to Aetherometry and the creation of NEF, Gene sacrificed, much too much—his own health included. Very few know just how much—but always he struck forward with a contagious joy and an irrepressible wit. Many who owed him unconditional support over the years failed to rise to the occasion of his battles. They are the dust that shall be forgotten when the achievements of this great man will one day come to full fruition.

We would like to finish this tribute to an irreplaceable pioneer, with the words Gene wrote to us and Uri and Malgosia in his antepenultimate letter, four days before his death:

> I believe it is *wonderful* that the Aether Motor patent has issued! Please do nothing to change that. . .There may be some other good things over the horizon. We cannot know the future. We need to preserve all the options we have. Let me just say that I am so greatly privileged to have dear friends and brilliant colleagues such as you all are. Life is an extraordinary adventure—both terribly painful and also filled with beauty. . .Good wishes and love to all.

Dear Gene, the privilege was ours. It was our profound joy to have known you.

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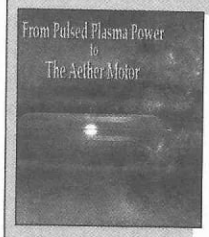

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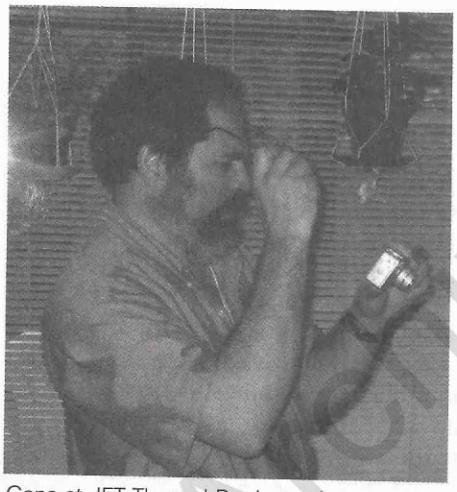
A Few Words Dedicated to Dr. Eugene Mallove

Mitchell Swartz and Gayle Verner



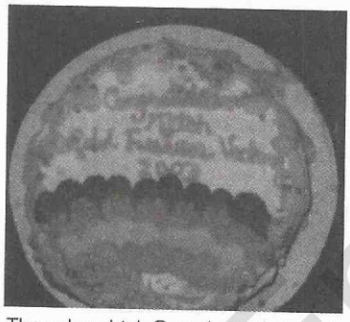
Gene at JET Thermal Products photographing excess heat indicators shown on the computer screen, just before ICCF10 in August 2003.

At least four words come to mind when we think about Gene: eloquence, intelligence, persistence, and connectivity. Eloquence because no one other than Gene could take a complicated concept like cold fusion and its web of history and make it so understandable and simple, with such beautiful descriptive phraseology that virtually everyone could comprehend it. His ability to communicate both verbally and in writing has been far understated. As a result, what Gene did for the world and his friends, and eventually readers, was to repeatedly remind us that there was hope and a reason to continue to fight for truth.

Gene sought the truth; his astute observations, his wonderful sense of humor, and attention to scientific detail made the dullest details come more alive. Everyone knew of Gene's sharp mental acuity, ability to take what was from other's perspective the most obtuse scientific ideas, absorb them, and help others grasp them better—making them understandable to everyone.

If it were not for Gene's "stick-to-it"-iveness, some of the developments in cold fusion and the accountability of cold fusion's early cover-up would still be at the back of the line. The same is true for other forms of alternative energy science. We never would have brought out the demonstration unit without Gene's help, encouragement, and suggestions.

Gene's ability to connect people from all walks of life has been unsurpassed by no one in this field, and as a result, in the United States, cold fusion became a more seriously respected science. It expanded, and soon Gene's interest in publications led to him being a Contributing Editor to *Cold Fusion Times* for two years, and then he created two additional superb energy magazines, including *Infinite Energy*, now read around the world.

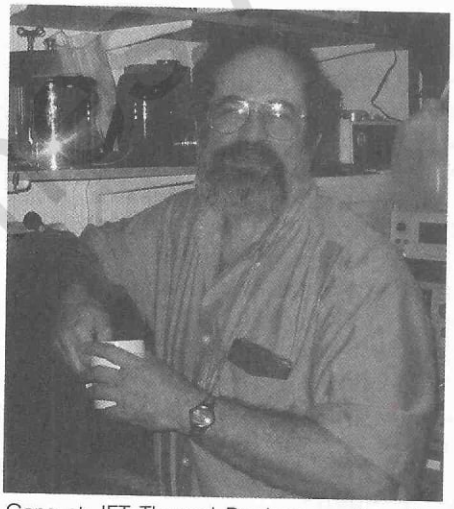


The cake which Gene brought to celebrate the cold fusion excess heat results. It reads, "Congratulations, Mitch. Cold Fusion Victory, 2003."

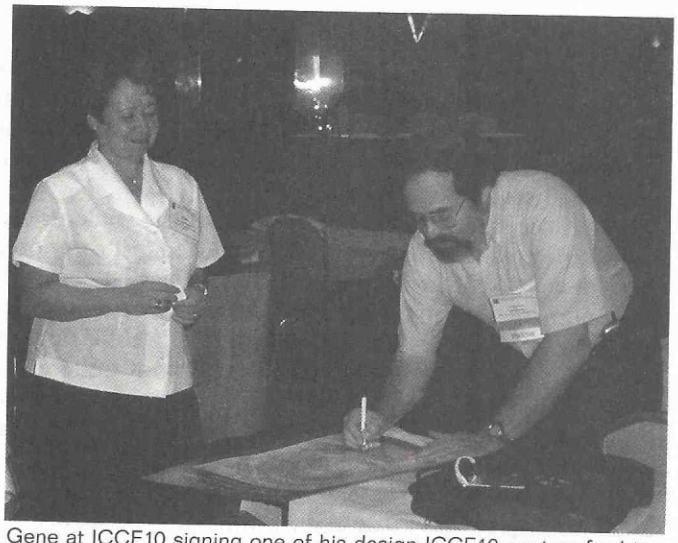
We think about Gene all the time and how much he meant to us. As the photographs and record show, Gene was thrilled when he saw the excess heat results, and the first time he saw it in our laboratory, he brought a cake to celebrate with us.

To say that Eugene Mallove will be missed is the understatement of the year.

Thank you, Gene, for all you gave us and the Universe, and for reminding some of us, *"Ad Astra per Aspera."* And to Joanne and family, our hearts are with you.



Gene at JET Thermal Products, smiling after helping to generate excess heat in a palladium heavy water system which was robust in the range of 250-279% excess energy at the watt level, in August 2003.



Gene at ICCF10 signing one of his design ICCF10 posters for Irina Savvatimova.

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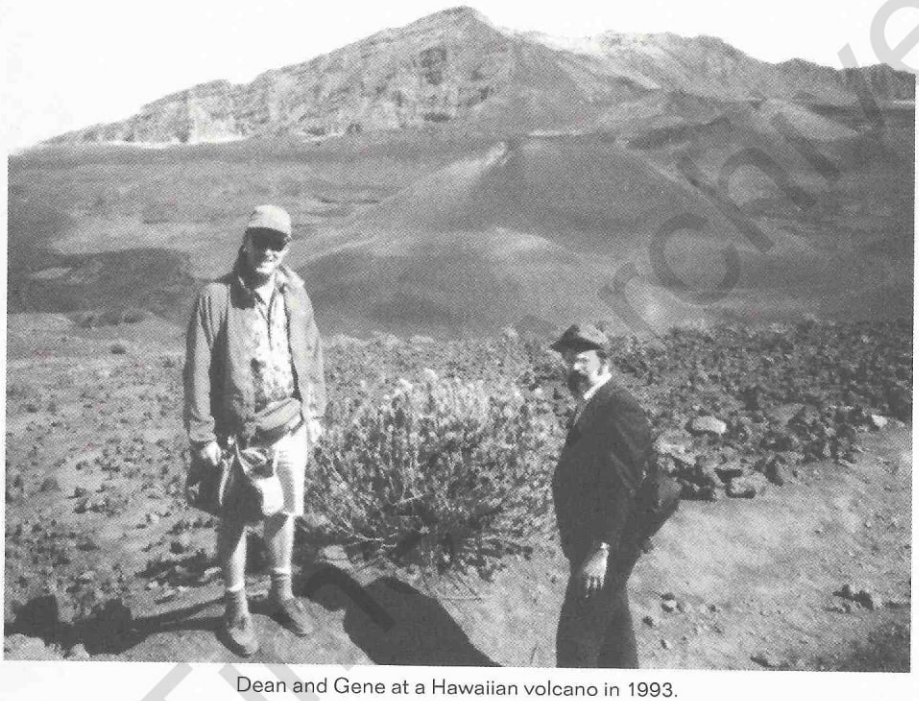
Gene Mallove: From Before Cold Fusion Through Tragedy

Dean Musgrave

Recalling Gene's life is a difficult task for me because we were friends since the mid-1960s. Gene was my closest friend from the MIT class of 1969. We both majored in aeronautics and astronautics and took many of the same classes, wherein Gene seemed to always do a bit better while still finding time to do other things.

Among those other things was the student-run MIT Rocket Research Society. Gene belonged all four years, serving as president the last two. Whether MIT, or any school nowadays, would currently let students build and operate amateur rockets, both solid and liquid-fueled, is an interesting question but at the time it was great fun.

During our senior year, we joined others in a graduate level course which included a trip to Cape Kennedy to watch the Apollo 10 launch. We were all permitted to go, perhaps, a thousand feet closer than the viewing stands and I'll never forget the powerful, infrasonic sound field. Gene, however, was not with me at that moment.



Dean and Gene at a Hawaiian volcano in 1993.

In typical Mallove style, Gene had convinced a perimeter guard that he was a personal friend of Dr. Wernher Von Braun and that he had permission to go another 1,000 feet forward. It was from that location that he took some photos and sound recordings.

In addition, we had a nice tour of the facilities and I also remember walking on the beach with Gene. After a quick dip in the ocean, I remarked to Gene how different the world was there than at MIT. Gene was thinking backward in time, commenting on how the area must have been in the age of sailing ships and Caribbean pirates.

After graduation we each went separate ways for a few years and I remember seeing him at class reunions. It was in the late 1970s, or very early 1980s, that Gene exclaimed that he wanted to write about a number of topics but, unfortunately, had no writing experience.

One of the standing jokes at MIT is that the students can write if they really have to, but they prefer to just carry on a peaceful coexistence with the English language.

I commented to him: How hard can it be to write? While we didn't get 800's on our SAT verbal tests, we did do very well and it must be possible to write and do it quite effectively. I definitely encouraged Gene to do some writing and he ended up eventually doing entire books while I only pen short science fiction stories as a hobby.

One of the many sad aspects of Gene's death is that a couple of months earlier I had mailed him the best science fiction story, by far, that I had ever written and, in a phone call a few weeks before his death, he said that he would read it and we could discuss it at the forthcoming class reunion.

Now, I guess, I'll never know if he read it or not. I suspect that he didn't since he was so incredibly busy and he would have probably waited until closer to the last minute.

I had outlined a science fiction novel many years ago and reviewed some of it with Gene. We had an agreement to collaborate on it at some future date when I was retired and he could find the time to help some. The novel has a unique plot and Gene and I were thinking TV and movie rights which could eventually fund more cold fusion work. Yet another project that Gene wanted to do in the years to come.

If I ever finish the novel, I'll dedicate it to Gene.

In 1993 I attended the fourth cold fusion conference (ICCF4) on Maui with Gene. One of my relatives had gotten us a fabulous condo for the week; we each had our own large rooms plus an additional magnificent room in case a certain very famous person decided to attend. Although they didn't show up, it was still an incredibly exciting week anyway and it definitely confirmed my suspicion that cold fusion was a real phenomena.

Among the many events that I remember was Gene's comment as we walked down to the beach one day. Prof. Martin Fleischmann was walking out in the water and Gene turned to me and said: "Look, Dr. Fleischmann is swimming in the fuel tank!"

Another interesting experience happened at the end of the conference. I had a rental car and that day I decided to drive to the top of the volcano and look it over. Gene had

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things to do but he managed to join me at the last moment, still wearing a full suit. The suit was needed for one of his duties but he was not comfortable in it.

When we got to the volcano, it was so intriguing that we decided to join some others, including Prof. Stringham, on a brief hike down one of the many trails. Gene's suit got slightly sandy but, even worse, he was too hot and the elevation (10,000 feet) bothered him a little bit. A group of hikers passed us going the opposite direction and one of them commented that Gene must be an attorney, dressed as he was. We all laughed and Gene gave the fellow a cold fusion business card.

The most important aspect of my memories of Gene, however, is his legacy of thoughts regarding the scientific method.

Gene's rule number one was that experimental data trumped theory. While it's probably true that the theorists are often smarter than the experimentalists and that the theorists are more likely to be found walking onto the stage in Stockholm to pick up their Nobel prizes, a flawless experiment can totally demolish a brilliant theory.

Somehow, science has gotten off course and data in any field that causes trouble for the current theories is often rejected. This circumstance must change if progress is to move at a faster pace.

Another of Gene's guiding principles was that new ideas deserved a thorough and impartial evaluation. Although a fair amount of review went into the articles Gene published, I believe that he did not consider some of them to be true or ever likely to be found to be true.

Nevertheless, he believed that a forum like *Infinite Energy* magazine was needed precisely because no one could determine at the outset the ultimate truth or utility of a new idea. A good chunk of the existing scientific literature is bogged down in trivial updates to established principles with new ideas not a big player, yet another circumstance begging for revision.

Gene's personal integrity was a stellar example of how science should operate. Unfortunately, here is an area also ripe for reform. Commercial interests, academic conflicts, personal ego, and bias all stand in the way of truth and progress suffers for it. While these problems can never be eliminated, the world must do better and Gene's life shows as an example how exemplary one person's integrity can be as an inspiration to all others.

The final legacy we collect from Gene is passion about one's work. A brief perusal of historic inventions and discoveries shows that passion is often the crucial ingredient and that a nine to five workday of meeting other peoples' goals is not enough. All it takes to change the world is one passionate person. When the dust ultimately settles on the cold fusion debate, Gene will stand out as the one person on the planet who did the most to point everyone in the right direction. Although he did not discover cold fusion, Gene will be remembered simply because he saw the truth and acted passionately upon it.

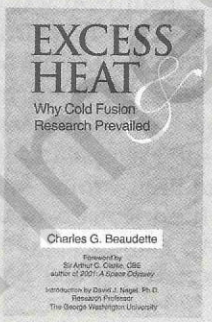
Between the time demands of the undergraduates' endless required courses on partial differential equations III, second term wave mechanics, and so forth, there is little or no room for a class discussing the history of science, the scientific method, or great mistakes from the past. Gene's life reveals what a struggle it is to try to remedy that oversight.

Well, I've come to the end of some of my many memories of Gene and it's been so hard to write this story down. Unfortunately, when creating an electronic file, there's no chance of tears staining the paper. As my wife Kathy lamented: "I wish that we could have seen him one more time." My deepest sympathy goes out to Joanne and the children over this devastating loss.

I'll never forget Gene and thoughts of him will be renewed every time a new piece of life's puzzles falls in place and I am reminded of something innovative that Gene missed due to a life cut tragically short.

In closing, it seems appropriate to underscore Gene's perennial optimism with an Edward Young quote that he used in *The Starflight Handbook*: "Too low they build, who build beneath the stars."

Log on to www.iccf11.org for information about the 11th International Conference on Cold Fusion—Marseilles, France, October 31 - November 5, 2004.



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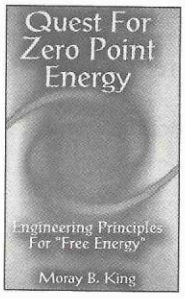

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In Memory of a Fallen Friend

Stephen Kaplan

It is now (at the time of publication) nearly two months from the time when my friend Gene Mallove was murdered. I still can't fully believe he is gone. He was too vibrant and full of life to be taken from us so soon, at the height of his power and so close to achieving some significant victories in the campaign to bring new energy to the world. When I do realize he's gone, the pain of his loss is terribly real. I think of him often.

I first met Gene over the phone. I was researching the field of new energy with Dr. Brian O'Leary to prepare an overview article on new energy R&D developments (online at www.newconnexion.net/kaplan). I was referred to Gene as one of the most knowledgeable people on the subject who could certainly help guide my inquiry. Our conversation was the first of what would be a long series of updates from Gene, which I treasure.

These are just a few of the outstanding qualities I enjoyed during our association. First, Gene was a man who was a dedicated scientist in the purest sense of that calling. Although a fiercely committed advocate for new energy, he was always committed first to truth. On several occasions, he would announce in his *Infinite Energy* editorials breakthroughs he believed had been reached and then publish in subsequent issues statements that he had been wrong, that the data now available did not support his original conclusions. That's a sign of intellectual honesty, and his ongoing willingness to correct himself when necessary earned him my deep respect and trust.

Second, Gene was a fighter. He moved relentlessly against the often seemingly insurmountable barriers put up by closed minded establishment scientists to workers in the field. We frequently discussed the inability of many scientists to look at the data that challenged their cherished paradigms. We laughed together at some of the more extreme examples of their unscientific prejudices, such as the remark of one Nobel-prize winning scientist who claimed in a public meeting, "There is no evidence for cold fusion, *and there never will be*" (italics mine). Often, an exasperated Gene would privately use colorful and salty language to describe the latest member of his personal Hall of Shame. His lack of respect for most of the nation's media, which slavishly took their lead from these obdurate establishment scientists, was equally strong.

Despite great odds, Gene persisted in writing and networking tirelessly to share knowledge and gather needed funds to move the new energy field forward. His influence on me in this regard was immense, for I doubt that I would have persisted as an advocate to this day without his inspiring example.

I remember Gene as a loving man. He loved and cherished his family above all else. He also loved his friends and colleagues. And no one could have done and sacrificed as much as he did without a great love for humankind.

I remember in particular his kindness toward me and my family. Knowing my limited financial means, on a number of occasions he made it possible for me to attend major new energy meetings by asking the sponsors to waive registration fees or by bringing me in on a press pass. He arranged for my wife Kaycheri to present her dramatic reading called "Leah" at his synagogue, and not only graciously introduced her but made a video tape of her presentation. And I still remember how he and his lovely wife Joanne generously hosted us in their home.

There is so much more I could say. I want to conclude, however, by saying how much I appreciate Gene's immense joy in exploring the universe and sharing that joy with others. He was always looking at the largest implications of the new energy findings for physics, chemistry, and a range of other sciences. He also explored the implications of breakthroughs for human societies and how they could be improved. I learned so much from Gene about the history of science and how paradigms are formed and changed. It is a continuing adventure, as I will go back to his writings again and again to expand my understanding of science and nature.

Gene was a great man, one of my heroes. We will not see this light again on this plane, as he is off to new adventures. His example will inspire me and I trust many others to redouble our efforts to move the new energy field forward for the sake of human liberation.

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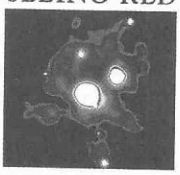

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Gene Mallove: The Leading Light of Cold Fusion

George Miley

Gene Mallove's untimely death has shocked his many friends and colleagues worldwide. I would like to provide a few brief reflections in his memory. I first met Gene at an early cold fusion conference during the period when he was embroiled in controversy as science editor at MIT. At that time Gene was still mildly skeptical of cold fusion claims. However, as we know, after a careful personal study of existing evidence, he became convinced that the phenomenon is real. Thereafter he never wavered from this view. And as positive data continued to pour in, he grew even stronger in his conviction, despite the many counter claims and vicious controversy. This confidence and courage, stemming from a careful in-depth study of a subject, set Gene apart from many other scientific editors. We all know how the controversy around Gene deepened and led to his founding of *Infinite Energy* a few years after leaving MIT. In addition to courage, this endeavor required a vision, optimism, and deep conviction that seemingly insurmountable obstacles could be overcome.

During the following years I had a number of personal interactions with Gene. Some concerned articles for the magazine, others involved consultations regarding new inventions proposed to him for evaluation. An intense interchange occurred when Gene became convinced that a student-type experimental "kit" was needed to lead interest in cold fusion. Even though I protested that a simple low cost, foolproof kit seemed "impossible," Gene persisted that I was an ideal person to devise one. He even obtained funding for me to study development of such a "kit." When I told him my approach to a kit was not working out (basically the complexity and costs were too much to be practical), he almost became depressed in his frustration. However, within days he bounced back suggesting alternate approaches and redoubled his effort to encourage me to keep trying. Once Gene became really convinced of something, he refused to give up! His unique blend of determination and optimism set him apart and provided cold fusion with the "leading light" needed to survive in the dark days that overtook the field.

Gene was also my most outspoken and vigorous supporter during the time that the DOE retracted my cold fusion research grant after it had gotten through a highly selective peer review panel in the DOE-NERI research program. Unfortunately, the political strength of opponents prevailed, despite Gene's gallant effort to change minds at the DOE.

Gene always attended special cold fusion sessions that I managed to get into ANS meetings and Scott Chubb got into APS sessions. I can still picture him arriving with a heavy wheeled case carrying his video camera, used to document many of the talks. I imagine he had a real problem, including a backache, lugging all that around through airports, but any inconvenience was easily overshadowed by his enthusiasm for getting to the meetings and interacting with attendees. He took great delight in the haring about and interpreting new research results and stood ready to respond to critics in a logical and courteous manner. The excitement he added to these sessions (and other cold fusion meetings) will be sorely missed by us all.

We all recognize the indispensable role Gene and his magazine *Infinite Energy* have played in keeping the cold fusion light burning during many dark days. The fact that the field has survived and has regained much credibility is in no small part due to Gene's efforts. His example of courage and enthusiasm is a lasting example for us all.

Gene Mallove's Magic

Scott Chubb

Gene Mallove had magic because he loved science and words, and he also loved the unknown. His words made people remember that to pursue the truly magical things in science, it is necessary, above everything else, to be open to the unexpected. Five years ago, Gene inspired me to write that "Science is magic that works!", in my comments commemorating the tenth anniversary of the initial announcement of cold fusion. But as opposed to commenting about cold fusion, I was really paraphrasing his philosophy in the most general terms: For science to really work, it has to be magical; and to be magical, it has to involve the unknown and the truth. Science can't be dictated by proclamation. It has to be revolutionary because it has to be alive, vibrant, and altogether genuine. Gene knew this. From beginning to end, he recognized that when true science is done, it can only be like this. When it is like this, it is magical.

In losing Gene, we have lost one of the greatest advocates of science and truth. And we have lost some magic. But we can get at least part of it back if we continue to believe, as he did, in ourselves. We can carry on. We can be alive. We can be magical. If we do try, we can and will live up to our greatest aspirations. Then, in ways that we never thought possible, the magic can occur not only in science but in life.

The magic that Gene gave us lives forever. It involves believing in ourselves and that anything is possible. Whether I was arguing with him about the "truth" of "scientific law" or whether or not this question had no answer, or if some new "discovery" was real or absurd, he inspired me to think about what might be, as opposed to what might not be. He was always a beacon of hope and imagination. Even without him, this beacon lives on. Especially, now, we must feel it and experience it because he would not have allowed us to do anything else. Then, his magic will continue, and it will continue provided we remember him and all that he stood for.

More than anyone I have known, Gene had a way of igniting my deepest feelings about the good things in science: the magic, the idealism, and trying to find the truth. He kindled in me the magical wish that "science" can be all at once alive and work in new and mysterious ways when we let it work. I always will be thankful to Gene for bringing this magic to me and to those of us who knew him. Although he is gone, his spirit lives on, and his magic continues in all of us who knew him. I mourn his loss, but I am truly glad that I knew him. And I celebrate his magic, now and always.

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Remembering Gene Mallove

Mike Carrell

My involvement with Gene Mallove was one of the significant encounters of my life. It led to pathways I would not otherwise have traveled, to vistas I would not otherwise have seen. For that I am continually grateful.

The Fleischmann-Pons effect was announced at about the end of my 38-year career with RCA. I was aware of the debates, but it passed from my attention as I was busy with consulting and volunteer work for several years. A cover story in MIT's *Technology Review* by Dr. Ed Storms reawakened my interest in cold fusion. I subscribed to Gene's earlier magazine (*Cold Fusion*), and to *Infinite Energy* when it began publication. I lurked on the science.physics.fusion forum and two sane voices emerged from the flames, those of Gene and Jed Rothwell. Jed pointed me to Vortex, where I have participated for years, as well as the Hydrino Study Group, devoted to the work of Dr. Randell Mills.

I could not judge the merits of various arguments by themselves, and wanted to see the people. I drove from the Philadelphia area to the Boston area for a seminar where Gene spoke. I shared a dinner with Gene, Jed, and Chris Tinsley. In that same period I began judging in the International Science and Engineering Fairs. At Birmingham, I found one student who had entered an unsuccessful Fleischmann-Pons experiment; behind his display was a copy of *Fire from Ice*. I put Gene in touch with the student, who later wrote a short piece for *IE*.

I realized that Gene was at the center of a network of information about unconventional science, the tender green things that grow in the cracks between paradigms. I made it my business to be on good terms with him, becoming a "friend of the family," giving assistance and support in many small ways. I visited his home with my wife, meeting Joanne Mallove and seeing the nook where Gene created the early issues of *IE* himself with a donated desktop publishing system. He also did the mailings himself.

We became close and I was a confidante in things he felt comfortable in sharing. As time went on, there were countless phone calls, e-mails, many visits to Bow, and a number of sleepovers at his house. He asked me to review books and do articles about some emerging technologies. These included Prof. Arata's work with his hollow Pd cathode filled with Pd nanopowder, Dr. Mills' BlackLight Power technology, and Dr. Paulo and Alexandra Correa's Pulsed Abnormal Glow Discharge. In addition I reviewed Joseph Newman's Energy Machine, a study of Bessler's Wheel, and others. All these were challenging, requiring hard study as they were outside my career involvement with electromechanical systems.

Gene was much more than a magazine editor. From the time he discovered that MIT had falsified positive evidence for cold fusion, he left a comfortable job and became a tireless advocate for not just cold fusion, but the whole range of neglected and anomalous energy phenomena. In some years, he had a teaching day job to make ends meet. An effective communicator, he sought out patrons and was a speaker at many gatherings of wealthy investors seeking the "new thing." A very generous patron supported him for several years, enabling additional staff and a small laboratory.

Gene was a recipient of a continuing flow of papers, announcements of over-unity inventions, and the like. The papers were a mix of substantial work by competent scientists, sincere but misguided experimenters, and a scattering of possible over-unity devices. He interviewed many. There were visits to promising sites, and in some cases bringing devices to Bow to be tested in his lab with the help of Ed Wall, Jeff Kooistra, and Ken Rauen. Efforts were made to duplicate experiments and processes of interest. Gene had hope of setting up a demonstration room of prototypes of working over-unity devices for the press and investors. At one point he invested a significant amount of his own money in a device that seemed promising. In the end, nothing came of these ventures, which were undertaken in good faith and trust that someone could come upon a replicable effect.

During this time Gene asked me to be on the board of Cold Fusion Technology, the then parent company of *IE*. The other board member was Jed Rothwell. Gene, of course, had the sweat equity and it was his show, but I was pleased to be asked to participate in an active way. In time, events unfolded which created a situation where I resigned from the board.

In all of this, I developed a fondness and deep respect for the valor Gene demonstrated in his quest. He went out on limbs all the way to the twigs. In his best moments he was a generous, inquisitive, open human. He was also highly stressed. I once arranged for him to lecture at Temple University's Center for Frontier Sciences. While chatting in the departure lounge of the airport, waiting for his return flight, I asked him what he wanted. In a word, it was "vindication." The acute tragedy is that he died when vindication may be near in a report from the new DOE review.

When the history of this time and these events is written, Gene Mallove will have a place of honor among the pioneers.

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Galileo of Our Time: In Memory of Dr. Eugene Mallove

Brian O'Leary

This memorial originally appeared on the website www.newenergymovement.org.

We are heading towards almost certain global ecological disaster through unsustainable energy practices. Our addiction to oil, coal, natural gas, and uranium has killed hundreds of millions of us and untold species from foul air, water, and earth and accelerating global climate change. It has created wars, obscene profits, and false economics that could do us all in.

For all their promise, solar, wind, hydrogen, biofuels, and other conventional renewables have limited potential to replace the fossil fuel economy. They can consume a lot of land, materials, and capital. Moreover, wind and solar power cannot operate under all weather conditions.

Much more elegant and powerful solutions might be found with further research and development on new energy sources such as vacuum (a.k.a. space or zero-point) energy, cold fusion, and advanced hydrogen chemistry. Tragically, however, since the time of Tesla, the powers that be have effectively suppressed the research of hundreds of unsung inventors whose technologies promise a quantum leap that could catapult our economy and environment into a clean, safe, and sustainable twenty-first century.

Nobody knew and expressed this potential better than Dr. Eugene Mallove—a scientist, journalist, educator, visionary, humanitarian, friend. On May 14, he was mysteriously murdered during an apparent robbery at his childhood home. He was in the prime of his career at age 56.

This is a great loss which is just beginning to sink in. So prolific were his writings, so passionate was his expression, so unique were his connections between the scientific community and the new energy vision, he will be sorely missed. He is one of my heroes. It will be difficult to fill his shoes.

As chief science writer for MIT some fifteen years ago, he first got into the new energy game by investigating the controversial discovery of cold fusion in 1989 by University of Utah chemists Drs. Martin Fleischmann and Stanley Pons. His investigative reports on the research of MIT nuclear physicists with a vested interest in hot fusion research revealed that they fraudulently reported their inability to replicate the original Pons-Fleischmann experiments. Their "unadjusted" findings actually reinforce the truth of the discovery. The efforts of these scientists and other establishment researchers at major universities to discredit cold fusion under the auspices of the U.S. Department of Energy will be remembered as a sad lesson in scientific ethics.

Risking everything, Gene Mallove resigned his position at MIT to reveal the truth about cold fusion regardless of ridicule and financial insecurity. He wrote a book, *Fire from Ice*, which was nominated for a Pulitzer Prize. The facts revealed in that work led the great writer Arthur C. Clarke to conclude that the suppression of cold fusion was "one of the greatest scandals in the history of science."

Gene has been at it ever since. His authoritative books, his numerous editorials and writings in the successful magazine *Infinite Energy*, his support of the work through the offices of his New Energy Foundation and New Energy Research Laboratory, his many media appearances, and the excellent video "Cold Fusion: Fire from Water" underline the boldness with which he struck out on his mission, fearless about threats to his career which otherwise would have been secure. He stands alone in organizing and supporting the cold fusion scientists, which has grown to a community of several hundred researchers from prestigious institutions, meeting annually and publishing in the best peer-reviewed scientific journals. Against all odds, cold fusion has become a viable science with great potential because of the tireless and selfless efforts of this one man. He was a giant.

To underline my remarks, just visit *Infinite Energy's* website, www.infinite-energy.com. In my most recent book, *Re-Inheriting the Earth*, the index shows more pages of citation to Mallove's work (nine) than that of any other individual. He was very grounded and did not venture into consciousness science as I had done. This made him all the more credible. He never succumbed to the pseudo-scientific claims of New Age pundits and acted as a responsible scientist throughout. He didn't play favorites but looked at all viable alternatives with intellectual honesty.

Gene's standards were always very high. He did not buy into fads and politics. His rigor could be very disarming to those toeing the line of the Establishment and was an inspiration to all fellow heretics. I not only stand in awe of his achievements, I will miss the opportunity to team with him to raise the credibility of new energy research and development.

He had proposed to the Democratic presidential candidates the establishment of an Office for Unconventional Energy in the Department of Energy (DOE). During a candidates' panel he orally presented the idea, and three of the candidates endorsed it. We can largely thank Gene that the DOE is now reviewing the cold fusion concept, something that would have been unthinkable during the past fifteen years.

Gene's grasp of historical analogues such as the development of aviation, relativity, quantum physics, the Copernican revolution, and the Enlightenment, as reported in *Infinite Energy*, are inspiring and prolific. His writings provide a deep and insightful understanding of the historical patterns of scientific progress and censorship that we now face in new energy research.

This tragedy all the more inspires the New Energy Movement to advance our mutual cause. We must get the word out as quickly and widely as possible. We will hold our first conference in Portland, Oregon at Reed College and Portland State University on September 25 and 26. The gathering will be dedicated to Dr. Mallove. We invite you to come and share in the history and new knowledge which is so badly needed to save the planet.

Novelist Mignon McCarthy said, "Each society honors its live conformists and dead troublemakers." I believe that the world will remember Dr. Mallove as one of the greatest scientific pioneers of history, a Galileo of our time.

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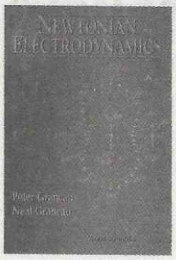

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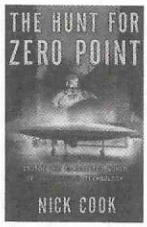

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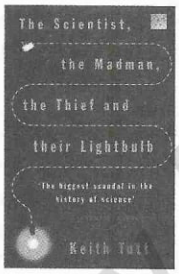
The Scientist, the Madman, the Thief, and Their Lightbulb
by Keith Tutt



This is the U.S. release of the book originally titled *The Search for Free Energy*. Tutt presents the many new energy/free energy inventors of the past 100 years, from Nikola Tesla, to Stanley Pons and Martin Fleischmann, to Randell Mills and Alexandra and Paulo Correa; the book includes two chapters on the cold fusion field and its researchers.

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The Eugene Mallove MIT 1969 Memorial Fund

Eugene Mallove had a dream for the future, one filled with "infinite energy"; even though tragically his future was taken from him, we can all help to perhaps see his dream come true. To help to make his dream come true, we need to harness the infinite energy of creative youth, and we can do this with the establishment of the Eugene Mallove (1969) Memorial Fund at his alma mater, MIT.

This endowment fund will provide a scholarship to a student who shows promise, vision, and dedication to the pursuit of renewable energy systems. Students could apply for the scholarship their sophomore year at MIT and, if selected, receive it for their junior and senior years. Students would be selected by submitting an essay describing how the scholarship would help them to develop renewable energy systems.

The Eugene Mallove (1969) Memorial Fund Review Board will review the essays and select the winner. *Infinite Energy* will print the winners and make periodic announcements about their accomplishments. The core members of the Board will be comprised of members of the Mallove family, Prof. Alexander Slocum, and Debra Slocum. Other members can be added as needed. Gene's wife, Joanne, is the Slocum's son's piano teacher, and this tragedy has touched them deeply, as it has us all.

One criterion required of the scholarship recipient would be that he/she lead a small seminar on their research in the spring semester. Alex is the director of MIT's Experimental Study Group (http://web.mit.edu/esg), and he would see that the seminar would have a home in ESG, but of course be open to all students at MIT, Harvard, and Wellesley college (enrollment may have to be limited).

To help kick off the fund, Alex and Debie are seeding it with a donation of $1,000. It is hoped that Gene's friends will give what they can to help realize the dream. In general, an endowed fund can typically spend 5% of the principal each year. An undergraduate fellowship of $10,000 per year would attract the best, brightest, and most passionate. Three years into the program, this means the fund would be supporting three students per year; hence the fund ideally needs a principle of 10,000*3*30 = $600,000. Whatever funds are raised, how they are spent to support scholarships or prize money will be at the discretion of the Mallove family.

Tax deductible contributions can be made by sending a check payable to MIT with a note attached noting the fund name and account number (#2732129: The Eugene Mallove (1969) Memorial Fund). The address to which to send contributions is:

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Remembering Gene: Thoughts from Around the World

As a testament to the way in which Gene Mallove touched the lives of so many people from around the world, we publish here some of the many e-mails and letters we have received since his tragic death on May 14. Condolences continue to come in as more people learn about Gene's death.

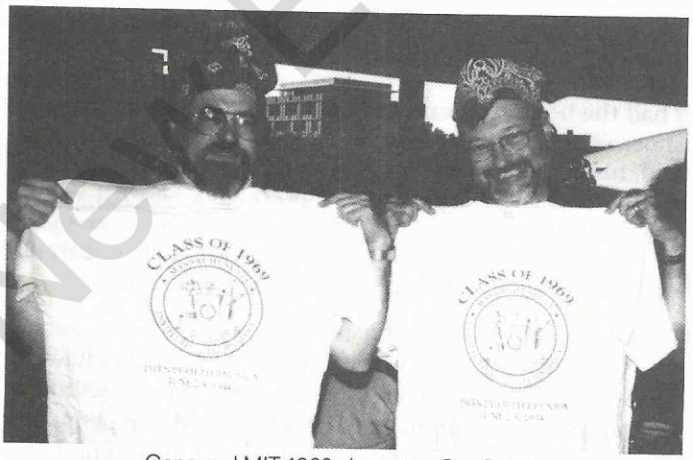
Friends and Family

It is with great difficulty that I am writing a tribute about my cousin because of a senseless murder that has taken him from us. Eugene, a young man, husband, father, new grandfather, and brilliant person who contributed so much to humanity. Eugene was our "celebrity" cousin, one we were most proud of; he amazed us with all of his achievements, both academically and personally. I recently had the wonderful opportunity to spend some time with Eugene during my visit to New London, Connecticut. We reminisced about our pasts and reflected on time we spent together as children. Eugene was the same sensitive, caring, and intelligent person I had known. I wish the distance, living on opposite coasts, hadn't kept me from knowing Eugene better. We will all miss him and will always have him in our hearts. —David Mannis

I'm so terribly sorry to hear of Eugene's murder. I grew up with Gene in Norwich, Connecticut and I knew his mother and father as well. Gene's father Mitchell was a plumber, as was my father, and he was a frequent customer at our plumbing supply house. I haven't seen the Mallove's since I left Norwich over 30 years ago. My condolences to everyone at your company and to his family. —Steve Sadinsky

I was shocked to learn of the brutal murder of Gene Mallove, who was my classmate at MIT and even lived in the same dormitory on the same floor. My deepest sympathy to all of his colleagues and his family. Of course, Gene was a driving force in getting cold fusion the respect that it deserves in the scientific community and his mission must go on. I hope that someone with his drive, determination, and technical expertise can be found to continue the mission. —Eugene Mannacio

We are stunned and shocked after just reading about Gene while glancing over the *Boston Globe* before bed tonight. Gene and I [Steve] worked together at TASC in the late 1970s. Our families became good friends and had many family dinners and great times during those years. Gene had an incredible drive to leave the world a better place for next generations to come. —Steve and Betsey Weiss



Gene and MIT 1969 classmate Ora Smith.

As a childhood neighbor, classmate, and friend of Gene's, I am shocked and saddened that we have all lost such a wonderful person and brilliant thinker. Gene and I would pass e-mails and I would send him chin up notes and tell him to keep the faith, the world will recognize this science soon. I always gave a look at the property when driving by in Norwich on my way to and from Salem and let Gene know if anything looked unusual. Somehow I wish I had gone by that way on Friday, May 14. Gene must be thinking that there is too much fuss about his accomplishments. I hope that some of the publicity will assist the world in recognizing his long-time dream: true scientific acceptance of new energy challenges to the old order. I used to tease Gene that quarks have a mind of their own. Perhaps ideas do as well. Time, as usual, will tell. —Pamela Reed Munro

I grew up about a mile away from Gene's childhood home. I still cannot believe the news of his death, but must eventually have to. For those of you who have only known him in recent years, rest assured that all of the descriptions of his passion for knowledge and good intentions go back to the early 1960s when we experimented with a lot of different science related projects. Who would have guessed that in two years, this small rural town in Connecticut would send five students to MIT (I was class of 1970). This is a tragic loss. I will always remember the twinkle in Gene's eyes when he was "on his game." —Charles Kaminski

There are no words at a time like this that can really help. The shock is too great and the pain is too raw for mere words to penetrate. I have known Gene since the fourth grade at John B. Stanton School and at our 25th Norwich Free Academy reunion, my husband Paul, also a childhood friend, and I renewed our friendship with him. We corresponded several times, but I didn't know then what a treasure the autographed copy of his first book would be until I lost my husband suddenly in 1997. I remembered the beautiful dedication he had written to us and it prompted me to contact him. Over the course of the next few years, his words of comfort and encouragement were so touching and sincere. He even sent a poem to me that reminded him of me and my husband. The last time we saw each other was at our 35th high school reunion. He was walking hand in hand with his wife. I gave him a big hug and a kiss to thank him for all he had done for me. Later he took my picture and sent me a copy of it, graciously saying that I was "just as lovely as ever." I guess what I really want to say is that Gene became the kind of man I would have expected, having known him as a kid. Back then he was caring, kind, brilliant,and passionate about his work. He was a "good kid." I don't think I knew anyone who didn't like him. He became a "good man"—noble and sincere. And though it is so hard to understand the untimely loss of "good men" such as he, his life will always be celebrated by those who knew him and especially those who were privileged to love him and be loved by

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him—his wife, his children, his co-workers, his friends. God's peace, my friend. Say "hi" to my Paul for me. —Pat (Erardy) Podurgiel

Colleagues, Readers, and Listeners

It was with great sadness that I learned of Gene's passing away from us bodily. But his family must surely know that his spirit will be memorialized by continuing to motivate those of us dedicated to improving life on our planet by the creation of new energy technologies. His presence amongst us surely will be missed beyond comprehension, but will certainly not have been in vain. He has left an indelible mark and legacy upon civilization that will not be erased! Men of his caliber are in severe short supply nowadays. That makes his loss all the greater. No one can fill his shoes. But surely someone will come forth to walk in his footprints and extend the foot-path he began! His guiding light is extinguished, but the remnant warmth of it will remain with all of us henceforth! God-speed to your reward, Eugene F. Mallove, you have surely earned it! With sincere condolences, and greatest of regards for this great man. —Von E. Ives

Steve Krivit told me the sad news of Gene's death. I am glad I took the chance to call him a few months ago. He sparked the fire that has resulted in three articles on cold fusion so far. He was a reporter as reporters should be: curious, critical, and upright. The community will miss him. I will dedicate my final article to him. I hope *Infinite Energy* will continue to be published. My sincere condolences. —Haiko Lietz

It was with great sadness that I learned of Gene's untimely death. We had known each other slightly for many years, but became quite close in recent weeks, as he learned details of our laboratory work in the conversion of zero-point energy. His was the bravest, strongest voice championing revolutionary energy technologies, long before the looming energy crisis became obvious to all. He will be sorely missed in so many ways. The world has lost a central figure in the fight for new energy and justice. My heart goes out to the family. —Mark Goldes

The world owes Gene a great debt and they are not yet aware. God bless and comfort his family in their time of loss. At least Gene witnessed the possible turn toward victory in his quest. Say hello to Chris [Tinsley] for us, Sir Mallove. —Terry Blanton

My deepest sympathy and condolences on this most sad day. Dr. Mallove will be missed by so many. What an unbelievable loss to humanity. —Howard Brinton

It is with great sadness that I just read about the tragic and senseless passing of Eugene Mallove. He was my hero, the voice of reason in the scientific community. His passing will not be in vain. I believe that the torch that Gene held so high and bright, to keep the (ice) fire burning, will be kept alive by those whose lives he touched. In these dark days, as the petroleum era winds down, we are in greater need of the alternative that Gene was doggedly pursuing than ever before. Gene inspired thousands, including myself, to research and find the working alternatives that the world needs so desperately. Indeed, the stakes are high, with evidence that war and misery will increase with each passing day that the great energy alternative is not found and implemented. He is greatly missed, certainly not forgotten, and an inspiration to do good for the betterment of humankind and the Earth itself. —Gregory Glenn

I just heard the news about Dr. Mallove's death. Another visionary gone. Unfortunately, it seems like politics is more important than science. Members of the American scientific community must move on from the solid bedrock set by Dr. Mallove and not let his death be in vain. I cry for my country tonight. —Dennis Mattingly

Please allow me to extend my condolences for the terrible loss of Gene Mallove. He gave this virtually unknown writer the chance to share ideas with a larger audience, and I will always be grateful. —Gordon David Kaswell

Dr. Mallove's death has left a huge void on the planet. I am saddened, shocked, and grieving with you. He was a giant and can never replaced. His work has been amazing and so needed in this day and age. —Susan Thompson

I am so very sorry to hear of the murder of Dr. Eugene Mallove. This a great loss to honest science. —Audrey Ruddick

Please accept my deepest and sincerest condolences on the passing of Dr. Mallove. I loved his work, and hearing him on the radio; he was so important to us all. I know this is a huge loss for his family, but for all of us as well. Through the good auspices of Richard Hoagland a few years ago, I was introduced to Dr. Mallove to give me suggestions for a specific conference. I was able to talk to him several times; he was helpful, willing, very nice, very supportive, a true gifted and loving person. I wish only the best of love and support to his family and friends at this time. —David Livingston

Dr. Mallove was one of the great minds of the universe, who was about to give a gift to the world. The world may never know who they have slain. —Rojerio Koite

I write this on the day I heard the news about Dr. Mallove. It's difficult to express how shocked and saddened I am. It's bad enough when such a valuable and tireless warrior for progress moves on to another plane, but to leave under this type of horrific and outrageous circumstance is just beyond words. I offer my condolences to Dr. Mallove's family and all who knew him and were touched by his presence. Though he never knew me, I think I speak for many who can say that he touched our lives and we thank him for his sacrifice, courage, and noble fight. Farewell, Doc, you will be missed. —Christopher Gray

I am deeply shocked and very saddened by the horrible news about the passing of Eugene Mallove. As a long time reader of *Infinite Energy* and advocate of frontier physics, I feel like a member of my family has gone. —Ronald P. Wilson

I had the honor of hearing Dr. Mallove on the radio and am shocked at his sudden departure. He was a ray of bright hope and his incredible work is of such importance to all of mankind today. Please carry on although I know it will be hard without him by your side. I am sure that based on the enthusiasm and passion he had for the sciences that he would want it to come to the fullest fruition. —Melanie Ashby

Dr. Eugene Mallove was on the "right side" of the energy debate. He quit a good job at MIT when they fraudulently modified the results of the original Pons and Fleischmann cold fusion confirmation experiments. The MIT experiments did prove cold fusion, but MIT was getting major grants for

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hot fusion research and was afraid that this cold fusion discovery would cut into their hot fusion research, so they changed the numbers and said cold fusion did not work, leading to Pons and Fleischmann being called frauds, and setting the whole world back decades, all for MIT's own personal greed. We might not be in this war (debacle, quagmire, a few other words come to mind) for oil in Iraq right now if MIT had been honest and we had moved ahead with cold fusion research honestly at that time. Dr. Mallove reported on many newer, simpler, and more elegant forms of cold fusion, with less exotic materials, that have been developed over the years. Unfortunately, after MIT's "debunking," none of the new experiments can get funding or objective reporting outside of venues like Dr. Mallove's magazine. Kind of like trying to get objective UFO reporting in the mainstream media after they were "debunked" by government experts. I corresponded with Dr. Mallove on a couple of occasions, and he was always gracious and helpful with anyone who asked a question or offered an opinion. Dr. Mallove was tireless and fearless in researching a wide variety of energy technologies, and reporting on them objectively and in a balanced manner. He recently reported on the Papp engine that supposedly ran on noble gasses, and would run for long periods of time in a closed loop (no exhaust) on very little fuel. He reported all angles, reported on independent attempts to re-create the effect, and concluded that the jury is still out on this device, though there are some theoretical possibilities into how it might work. Dr. Mallove consulted with Space Energy Access Systems (SEAS Power) and helped us with some of our testing, including a device that appeared to reduce significantly the amount of power an electric motor consumed, but turned out to be using "power effect" and primarily fooling the meters rather than actually saving much generated power. I have subscribed to *Infinite Energy* for a number of years, and the loss of his expertise, honesty, and ethics is incalculable for our planet. While I'm sure he is in very good company right now, we back here on Earth will miss him sorely. —Don Daniels

As is everyone, I am in shock and disbelief. Of course, words are inadequate. I believe right prevails in the end. Dr. Mallove's life will be remembered, and honored by us all. —Dave Moon

In February I received from Eugene a DVD concerning the research of Alexandra and Paulo Correa, in which Eugene introduced the subject and I followed with a further introductory commentary. It was marvelous to sense Eugene's enthusiasm in promoting a new energy project in this way, whilst also doing so much on the spread of topics reported over the years by *Infinite Energy*. In thanking him by a letter, which he chose to publish on the titled page of the article of mine that appeared in Issue 55, I included the words: "I wish you well and think your efforts in sustaining *Infinite Energy* at such a high quality level are indeed impressive and warrant the highest commendation." It came, therefore, as a dreadful shock, on the same day as receiving my copy of that issue, to hear that Eugene had been taken from his wife and family under such frightful circumstances. Eugene's influence extended beyond the U.S. and be sure he will be long remembered, the moreso if, as we hope and expect, there is ahead real technological progress on the pathways that Eugene was treading. —Harold Aspden

Eugene Mallove was an excellent scientific writer who was writing the truth, without any concession. His sacrifice will encourage more scientists to work hard for the truth. —Xing Zhong Li

I met Dr. Mallove on a trip to Concord with my friend Bill Simpson. I found him to be intellectually curious about so many things and, even though I am in a different non-scientific field, he took the time to explain the work and hope of cold fusion to me in terms I could understand. He showed interest and knowledge of my own field (the humanities). I think this is a great loss for so many people. —Peter Wilson

I was in touch over the past several years with Dr. Mallove; he made a lasting impression on me by his willingness not to be constrained by accepted ideas, but to dare to think beyond. In raising my children, I have made sure to explain: This is what we know now, it does not mean our ideas may not change later and while some ideas may seem crazy to us within our current context of knowledge, they may end up being true once we discover more. I feel deep sorrow at his death, and the new energy field has lost a valuable advocate. —Camille Grosdidier

I was stunned to learn over the weekend about Gene's brutal passing. I first heard of Gene when I read his seminal articles about interstellar spaceflight (*e.g.* "Interstellar Travel and Communications: A Bibliography," *Journal of the British Interplanetary Society*, 33, 6, June 1980), which I referenced in a paper I gave in 1988 on advanced propulsion and energy systems. We met for the first time in person in April 1993 at the International Symposium on New Energy in Denver. I presume he was interested in a presentation by Hal Fox on cold fusion and was probably invited by Hal to attend. Hal quoted Gene's 1992 article, "Cold Fusion: Real and Revolutionary" (*Fusion Briefings*, May 1992), in the references to that paper. Of great interest and amusement to me was talking to Gene as we sat listening to the after dinner speech given by Dennis Weaver. Dave Clifton and Hal Puthoff were also at the table. Apparently this was the first time that Gene had been introduced to the "free energy" movement, as separate from the cold fusion researchers. His eyes were wide and his amazement and enthusiasm were overflowing as he related with tremendous excitement the pending energy breakthroughs which the speakers all assured us were just around the corner. Unfortunately, none of the ideas have born fruit with the exception of cold fusion and possibly the Graneau electric arc work. "I had no idea that this had been happening for so many years," he said, referring to the series of symposia that had been promoting "free energy" since Dr. Nieper's conference in Germany in 1980. From there, Gene started to consider other possible energy solutions in addition to cold fusion. *Infinite Energy* has devoted ample space over the years to non-cold fusion energy articles. The next time I met Gene was at the June 1994 meeting of the Society for Scientific Exploration in Austin, at which he gave a paper "Cold Fusion: Heat (and Light) after Death." In typical fashion, his passion for the subject and his direct approach were reflected in the paper. In his abstract we read: "The hundreds of obituaries for 'cold fusion' were all dead wrong. . .The world's foremost scientific publications, *Nature* and *Science*, brutally attacked (and later ignored) cold fusion; both were catastrophically wrong. . .A staggering paradigm shift is emerging. . ." Gene was never one to mince words! I last met him in November 2002 in Washington at the Conference on Energy and Accountability, hosted by Tom Valone (Integrity Research

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Institute). Gene's presentation, "My Experience with the Correa Aetherometry," related his difficulties in getting scientists to take the Correas and their investigations seriously. Again, he was like a dog with a bone between his teeth—he just would not give an inch. Much the same could be said about the second part of his presentation on his struggles to get cold fusion a fair hearing in the greater scientific community. Gene's was the most passionate voice trying to spread the gospel of new energy solutions to the impending energy crisis. —George D. Hathaway

All of us at Planetary Health are saddened by the sudden loss of Gene Mallove. Humanity's progress toward an ecological civilization in harmony with nature has suffered a great setback. Let us dedicate ourselves to Gene's dream of discovering sustainable energy and continue in his spirit and vision. —Edward Esko

I heard Dr. Mallove for the first time on the Coast to Coast radio show with George Noory in February. Energy issues and policy are my main interests and listening to Dr. Mallove gave me a little more hope for the world. It was one of those "where have you been all my life" feelings. He was not just a soldier for the truth and Mother Earth, but a true warrior, because he knew what he was fighting for and was a leader at that. I have never met him personally and yet I feel sick over his death. I hope that his recent interviews will be made available. I pray that the staff of *Infinite Energy* can continue with the magazine. —David Latham

I met Gene at the INE Symposium held in Salt Lake City in the late 1990s. We were co-presenters along with a number of others who have been pressing the envelope on energy development research and technologies. During the years, I have read, quoted, and shared much of what I read in *Infinite Energy* with my peers, colleagues, and associates. —David G. Yurth

It is too soon for for Dr. Mallove to leave us. "Cold fusion" (a.k.a. LENR) is just about to come into full bloom from seeds that Dr. Mallove carefully nurtured for years in the face of academic opposition and government neglect. Dr. Mallove appreciated the first live demonstration of cold fusion at ICCF5 in Monte Carlo, which I participated in with Dr. Jim Patterson in 1995. Dr. Mallove as a true scientist encouraged practical experimentation over theoretical negativity. The elucidation of cold fusion theory is rapidly catching up with Dr. Mallove's vision. Eugene was a cold fusion pioneer who will benefit the lives of countless generations to come. —Daniel G. Zavela

Gene had such passion and dedication to bringing about a better world. I will always remember the unwavering confidence he placed in me and my crew during the production of the "Cold Fusion: Fire From Water" video. May the truth behind his work be recognized by all of us. —Christopher Toussaint

When much has happened to question American virtue, Eugene Mallove stood proudly as the kind of real American we should all strive to be. His honesty and dedication to truth and knowledge is the virtue that has made America worth loving and giving one's life for. —Bruce Arnold

Over the years, I had the pleasure of meeting Gene at various conferences and having dinner with him. He was exceptionally gifted in physics and open to the many anomalies which so many ignore. Without Gene, I have no doubt cold fusion research would have either died on the vine or been written off as a complete waste of time and resources. Gene was one of the most eloquent, informative, and entertaining speakers I have ever had the pleasure to hear at a conference. In our private discussions and correspondence, I found him engaging and very well informed. I always learned something from him. The one thing we disagreed on was his "irritation" in my calling the heat process in cold fusion a "novel battery" since you do have to replace the components once the heat production fades away. But Gene took it as just another view, erroneous in his opinion, but it didn't adversely affect his communications with me. Years ago, my organization, KeelyNet, posted an "infinite" display ad for *Infinite Energy*, of which I am a great admirer, in a simple exchange for a subscription. The magazine is outstanding in format, content, and presentation, definitely the work of Gene. I hope it does not fade away like so many do when the "ramrod" who created and kept it going is no longer there to keep it in operation. It would be a fine tribute to Gene if the Board of Directors could keep *Infinite Energy* from dissolving; I urge anyone who can to help them by subscribing and helping to promote the magazine to acquire new readers. Gene will be greatly missed and long remembered. —Jerry W. Decker

I admired Gene greatly; his death is a great loss. Gene was a genuine hero for his dedication to research and action in spite of opposition. We have lost a most important American. —Frederick J. Mayer

I feel sadness for the loss to the scientific community of an indefatigable champion for the acceptance of ambient-temperature nuclear reactions as a proper field of study. Those of us who are involved in that field should intensify our efforts to bring Gene's vision to a successful culmination. —Richard Oriani

From our limited human perspective, Gene's death was profoundly premature and untimely. Gene was a vibrant human being with unlimited value both to those who loved him and to the scientific community, to which he brought a unique combination of knowledge, interests, and talents as a science writer, spokesperson, activist, defender of truth, and enthusiast for new energy technology. Just as we would mourn the death of a child, whose greatest potential had not yet been realized, we mourn the death of Gene, whose potential additional contributions will never be known, and who was just beginning to enjoy the hard-won fruits of his labor. We feel sad for his family, who have lost a wonderful husband, father, and grandfather. We are reminded of the conversations we shared with Gene, his writings, his reasonings, and his voice. We remember his presence and feel his absence. Some wise person once said, "For every tragedy there will be a miracle of equal magnitude as a blessing that will follow." I don't know what it will be, but I do know, considering how great a man Gene was, that it will be tremendous. If Gene were here now, I believe he would express the utmost respect and appreciation to all of you, the courageous men and women who have journeyed with him these last fifteen years. He would say that you are the pillars of a new society built on a foundation of caring for humanity. That the revolutionary research you are conducting provides hope for each human being to achieve free access to resources, and with it, significantly more control over their

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(and our) lives. He would urge us all to persevere in our endeavors, and know that he will be celebrating our accomplishments with us. —Nadine Winocur

I had the honor of meeting Gene a year ago in Pembroke and we spent a number of hours discussing technology and theories. I will truly miss his great articles and deep insight into the wonder of physics. I can recall a meeting we had where I described some of the main breakthroughs in metallurgy I achieved for various industry. We discussed hydrogen and its relationship in those events in particular. Corrosion and cold fusion were in my thoughts after reading his book *Fire from Ice*; no doubt this element has a great place to look and as in all science there is always so much that is overlooked by our in-the-box mindsets. I hope that his work will go on, as that is what he would have wished. —Franz Schulze

A man seemingly of infinite energy, Gene personified integrity in science. The greatest tribute we can pay him is to continue his passionate work of bringing back the decency and fair play that have been long lacking now in what should be the hallowed halls of science. —Eugene Sittampalam

I am an *IE* subscriber, have communicated with Gene occasionally, and feel that Gene was doing exceptionally important work. Our world greatly needed his contributions and suffers for his passing. —Warren Rekow

It was with deep sorrow that we learned of the death of Dr. Eugene Mallove. His devotion to cold fusion activity won him the regard and admiration of all members of the cold fusion community. —V. Vysotskii, A. Kornilova, I. Savvatimova, N. Samsonenko, Yu. Bazhutov, R. Kuzmin, A. Lipson, I. Goriachev, A. Karabut, and V. Romodanov

Dr. Mallove will never know how many minds he touched, how many hopes and dreams he inspired. His life and principles will forever be an inspiration to seekers of truth and freedom. Godspeed, Dr. Mallove, and thank you for a life truly well spent. —Steve Prewitt

Gene Mallove held in his own single person a rare combination of talents and qualities. Others have some of these: Gene had them all. That's why he was so extraordinary, and why his premature death is so tragic: He was a scientist of the first order. Lesser scholars don't get called to lecture at MIT. He was a writer of rare ability, and in an age when writing good or even passable English is a skill seldom even coveted. He was a "mover and a shaker"; his persistence and patience persuaded people to act and speak and invest and work together for a noble common purpose. He kept and followed a vision, and drove himself and others to realize it, in an age when most people just work for pay. He could publish; he produced a first-rate magazine on a shoestring, packed with solid information. And, most of all, he was principled, in an age when most people hardly know the meaning of the word. He did what he saw to be right, at a cost to himself, when he could just have swum with the flow. My all-time favorite quotation is from George Bernard Shaw: "The reasonable man adapts himself to the world. The unreasonable man persists in trying to adapt the world to himself. Therefore, all progress depends on the unreasonable man." In this best sense of the word, Gene was an unreasonable man; and so without him, the world will progress more slowly. —Jim Davies

As a high school student who has passionately followed cold fusion research and the work of *Infinite Energy* for the past four years, I can only express my absolute admiration for Gene Mallove's dedication, strong will, and knowledge of cold fusion theory and technology. At times we didn't all agree with his views, but his voice will be sorely missed. He spoke the truth against all odds, and he brought a plethora of views to the table for discussion. May his family, friends, and colleagues find consolation in knowing that his efforts will not be in vain and that vindication will soon come. His works contributed to my decision to dedicate my future life as a physicist to cold fusion research, to help energize the field with new blood. —Maaneli Derakhshani

I didn't know Gene well at all. We had never met face to face. His appreciation of my writing, however, has been a major factor in my life and the changes I am going through right now. I was in the process of writing him to express this when I got the news of his passing. While I feel the loss in a less personal way than those who were close to him, the sense of loss and regret over things unsaid lingers nonetheless. The sadness over "what might have been" aches in my heart, not just for myself and Gene's friends and family, but for humanity in general. What I know of Gene I know from his public face in the magazine. My sense of him is that he was a person of vision and integrity, who cared deeply for the people of this planet. There are damned few in our society of SUVs, greed, and deficit financing who would take the road which Gene embraced. Most would knuckle under to the giants and drug themselves with the borrowed trappings of wealth to silence any pangs of conscience. Not Gene. He stood up and not only announced that the Emperor had no clothes, he documented and continued to expound upon that lack with intelligence and determination. He provided a voice and a focal point for others struggling in this field. He could have been far more successful in the financial sense by going along than by speaking the truth, but I have a feeling that he was simply not that kind of person. That we were honored with his presence for any time at all is a blessing. That he was taken from us so soon is a tragedy. It is up to us to take what he gave us in the time he was here and move it forward. We all need to cherish and embrace that integrity and vision that were his and make it our own. Whether his death was a random event of stupid violence or a purposeful act by those reeking with the stench of oil, we must still move forward. The battle for a clean, healthy planet for all is not one we can abandon. The battle for integrity and honor in our institutions is equally vital. In the final analysis this is not about one person but rather all people. Whether we win this battle or not, I for one intend to go down fighting. I do not know whether my contribution will be of any importance in the long run, but I can follow Gene's example that one person can make a difference in this world. Perhaps each person trying to make a difference is just exactly what life is all about. One of the first things that went through my mind when I heard the news were some lines from Peter Gabriel's tribute song "Biko": "You can blow out a candle, But you can't blow out a fire. Once the flames begin to catch, The wind will blow it higher. . ." The other song that keeps going through my head is Todd Rundgren's "Just One Victory." I will play that in my own private ceremony for Gene. Gene, we will not forget and we will not stop. —Jon Norris

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Although I never knew Dr. Mallove personally, I have followed his work in the cold fusion world ever since I was a chemistry graduate student at the University of Utah in 1989. Marvin Hawkins, one of my best friends these past 19 years, who was Pons/Fleischmann's principal graduate student in the original cold fusion experiments, has always spoken highly of Dr. Mallove as one possessing impeccable integrity. The cold fusion saga has been very eye-opening to me and has taught me that scientists are frequently not the unbiased seekers of truth that they are portrayed to be, but are often driven by the need for funding and peer recognition, seemingly above all else. The fight against low-energy nuclear reactions has been joined with an almost religious fervor by many of those in the scientific community who seem unwilling to seriously consider anything outside of their own narrow paradigm of beliefs. As I've observed Dr. Mallove's battle to bring to those interested a compilation of the research in this area, I've been amazed at his tenacity in the face of sometimes overwhelming opposition, with little hope of or even desire for any personal gain. I trust that the work that he has begun will be continued by those whose interest is simply to push forward what could be the most significant achievement science has seen in the last century. I wish I could have known him personally rather than from a distance. —Robert Bennett

I am but one of the faceless masses who can contribute nothing but prayers toward the success of this work. Any man who dares to stand against the power of the Devil, manifested in the greed and lust for power of evil men, risks his life and fortunes. Those whose life work improves the state of humanity will be remembered by those whose lives have or yet will be touched. I hope this loss will not slow the momentum of the work Dr. Mallove loved so dearly. —Mark A. McCoy

I am genuinely stunned and saddened to hear of the passing of Dr. Eugene Mallove. He was a crusader for science in the truest sense of the word, a pillar of our small community that is dedicated to following that most exciting road that is less travelled. His dedication will live on in the efforts of the millennium to come, where a New Physics will help to provide the freedoms that we have all dreamt of for literally centuries. Thank you, Dr. Mallove, for your tireless dedication and daring; you will be missed but never forgotten! —Steven W. Threlkeld

I worked with Gene, almost ten years ago, at PC Connection. He was always interesting and fun to work with. When he left the company, he was very excited about starting his new magazine. He kept in touch, whenever he called in for some computer supplies. I was so shocked and saddened when I heard about his passing. —Diana Garcia-Howell

When Eugene Mallove published my letter in *Infinite Energy*, my feet didn't touch the ground. When I received his postcard of Jacob's ladder, I couldn't think of a more apt metaphor of what he symbolized: A determined idea on the right track, pushing humanity to greater heights. When I clicked on *IE*'s website to renew my subscription, I didn't want to believe what I saw. That such a man should be taken from us seems a travesty. From where I sit, he appeared as someone who led by example—who challenged, exposed, and above all encouraged. I hope that not only does an endowed scholarship succeed, but that a book about him (his letters, speeches, interviews, etc.) will be forthcoming. My greatest wish, however, is that *IE* and the New Energy Foundation will continue to illuminate, inspire, and improve society. —Peter Ness

Gene wasn't the only one the criminals robbed on May 14. This world was robbed of a great mind and a person of astonishing integrity. We are all better people for having come in contact with him. —Bob Arnold

It was with great sorrow that I learned of the untimely demise of Dr. Mallove. Having met him ten years ago, and spoken to him numerous times on the beloved subject of cold fusion, I can appreciate the dedication and focus that he brought to his work. There is little doubt that without the editorial forum provided by Dr. Mallove and his continual promotion of this theme, that the advocates of cold fusion would have had a much harder road to travel to final acceptance. It is unfortunate that he will not be here on Earth to see his final vindication, but perhaps, as he looks down from Heaven he will see what mighty changes can be wrought from the force of one man. As we move from oil energy to fusion energy the economic forces will produce the rising tide that lifts all boats. Cheap power for cleaning water will produce vast agricultural areas capable of feeding the starving peoples in the world. Gene, would that you were here to see this. But once the powers that be see the true profit potential in this new technology, then the world will move to a new economy, just as in the past the world has moved from a wood to a coal to an oil economy with vast increases in wealth in every transition. We will miss you, Gene. —Robert Indech

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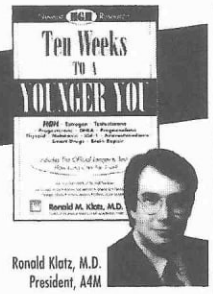

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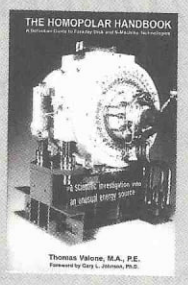

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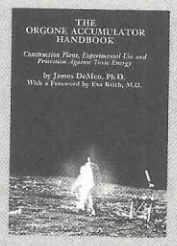

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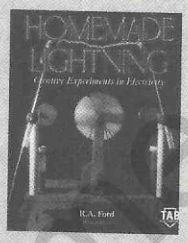

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Report on the 5th Asti Workshop on Anomalies in Hydrogen/Deuterium-Loaded Metals

Peter Glück

The Asti conference was held from March 19-21, 2004 in Asti, Italy. Photos are courtesy of Bill Collis, conference organizer.

Again at Asti!

I met Bill Collis, Asti organizer, after over six years had elapsed since Asti-3, and can state with a dose of envy that he has not changed—is full of energy, enthusiasm, important ideas, and initiatives. However, more people call him William now and his two sons are now serious little gentlemen admiring and helping their father.

Looking at the reports and photos of Asti-3 in *Infinite Energy* #17, I remember with great sadness that a leading scientist of Fusione Fredda (Italian for "cold fusion"), Giuliano Preparata, passed away so prematurely in 2000, and I am also shocked by the tragic history of the Cincinnati Group—one of the bright points of that 1997 meeting. Stan Gleason died soon after the meeting and this year, January 7, Don Holloman followed him; both are victims of leukemia, and both tried, perhaps too hard, to deactivate dangerous radioactive material.

Please allow me to tell you in a few words about the changes in my life. My friends—and I have a lot worldwide—know well that I am loyal and fully dedicated to cold fusion and, within the very limits of my existence, I am living with the aim to understand cold fusion and to help scale it up to a real technology. Thanks to the Internet, I am well-informed about the publications in the field and I am communicating with many of the primary sources. I feel it is my duty to express my gratitude to the magazine *Infinite Energy*, to the authors of the efficient http://lenr-canr.org site, and to Hideo Kozima, who keeps us up-to-date with the progress of the field in Japan.

Due to my dedication to cold fusion, my former colleagues at the Institute of Isotopic and Molecular Technology almost forced me to retire in 1999, and retirement here is similar to the classical Eskimo treatment applied to the old seal hunters—you get so little money that you can perhaps survive at a very low level of existence, but you cannot travel or invest in experiments or anything. You cannot buy books or journals, that's obvious. You are financially paralyzed. Therefore I started a new career and have learned a new profession—that of web-searcher and Internet journalist. I am now writing a weekly newsletter for Romania's most prominent Internet Service Provider and have just finished No. 92 of *Info Kappa*, at http://www.info.kappa.ro; it is mainly about how to search the Web and how to solve professional and personal problems by using the Internet. However, in many editorials I write about cold fusion and other new energy issues. As far I know, there are only two serious cold fusioneers left in Romania, Prof. Dan Chicea from Sibiu and myself.

With the generous help of my friends, I succeeded in participating at some of the major cold fusion events, such as ICCF9 in Beijing and, now, the 5th Asti Workshop. I consider this workshop, marking the 15th anniversary of cold fusion, to be very important both scientifically and politically. Yes, those are the proper words!

First, the Fifth Italian Colloquium for Cold Fusion was a great PR event, a meeting with the Italian mass-media and with the young generation who, hopefully, will benefit from the new energy sources based on these rather strange nuclear phenomena.

Second, the workshop *per se* was a good opportunity to analyze the progress in the field, to discuss with colleagues, and to prepare for the coming events; it was already known at the meeting that the U.S. DOE will organize a second panel to evaluate cold fusion and, in principle, the experimental certainties of the field are sufficient to overturn the negative conclusion of the infamous 1989 ERAB panel.

Third, finally cold fusion has a scientifically sound name and a professional organization, the International Society of Condensed Matter Nuclear Science (ISCMNS). The first general meeting of the ISCMNS took place at Asti and there are good reasons to believe that this should be the society of all people working in the field. And, I hope that soon a "T"—for Technology—will be added to the name of the society.

I also have to mention the Sicily-based Fulvio Frisone Foundation, which could play an important role in the future and development of Fusione Fredda.

The papers reviewed here are presented in chronological order. The papers and a complete list of authors can be accessed at the ISCMNS website: http://www.iscmns.org. Attending were many of the leading, most creative and active Italian cold fusion scientists, as well as a great group of students, plus representatives of the press. The following are brief overviews of the presentations from March 19-21.

Friday, March 19

William Collis, Organizer: "Introduction"

Our host told us exactly what he had to do to bring about the conference, and he did this well. He explained the principles of fusion and the history and importance of cold fusion, including that of the Asti Workshops. He encouraged the young people to understand and develop the field. Based on his initiative and with the generous help of Prof. John Dash, the students of an Asti high school performed a very interesting, relevant cold fusion experiment. Bill has again done a fine job in leading the conference.

Giuseppe Mazzitelli (ENEA—Italian Agency for New Technologies, Energy, and the Environment, Frascati, Italy): "Taming the Energy of the Stars: Thermonuclear Fusion"

An impressive overview about *hot* fusion by an expert.

Prof. Francesco Scaramuzzi (INFN—National Institute of Nuclear Physics, Frascati, Italy): "The Story of Cold Fusion"

Prof. Scaramuzzi performed the first gas-phase cold fusion experiment back in April 1989 and this was of paramount importance. I have to confess that of all the talks given at the

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conference, I enjoyed this one the most, despite the fact that I knew well everything he spoke about. But the story was presented in a such a charming and interesting mode, with a great literary talent! The author also handed me one of his fine papers: "Let's Speak About Cold Fusion" (in Italian), *La Termotecnica*, January-February 2003, p 136.

Antonella de Ninno (ENEA, Frascati, Italy): "Cold Fusion: What Questions Must We Ask?"
Dr. de Ninno and her team have obtained results of enormous importance and have undertaken a good experimental strategy. They use the Preparata theory for explaining the data and for planning future experiments. Enlightening questions and well-chosen scientific quotations were presented that demonstrate that this team has a good vision of future plans and experiments. Let's hope they will be well-funded!

Peter Glück (Astral Telecom, Cluj, Romania): "Prospects for the Future"
I lost my battle with the grammar of the beautiful, but difficult, Italian language. However, it seems I succeeded in conveying my message regarding the strategy of the field based on consolidation, enhancement, and scale-up of cold fusion systems. I explained why the problem of reproducibility actually has great informative value and presented the concept of "energetic nepotism"; we have to find and make operational new, abundant, healthy energy sources for our grandchildren.

Prof. Franco Raverdino (Istituto Statale "Augusto Monti," Asti, Italy): "Cold Fusion at Asti: Experiments Performed at an Asti High School"
An electrochemical cell, Pd cathode, Pt anode, H_2SO_4/D_2O electrolyte, and recombination catalyst were used for a few educational preliminary experiments. The students learned the basic measurement techniques and the heat balance calculations. A marvelous initiative carried out very well by the professors and supported by Dr. Collis, Prof. Dash and Prof. Spallone. We could see that the young generation is open-minded and so are many Italian professors.

Yasuhiro Iwamura, one of the first recipients of the newly-minted Giuliano Preparata Medal.

Poster Presentations

N. Comisso, G. Mengoli, and G. Zannoni (CNR-IENI, University of Padova, Italy): "Electrolytic Loading of Hydrogen into Pd Powders"
A very elaborate, important experiment—the connection between cold fusion and nanotechnology will be essential. See, for example, the exceptional achievements of Arata (emphasized by the authors) and of Reifenschweiler (see *IE* #54). It seems that the electrochemical measurement of the loading ratio for nanometric Pd powders is inherently very complex. I hope this work will be continued.

Dennis Letts and Dennis Cravens (U.S.): "Cathode Fabrication Methods to Reproduce the Letts-Cravens Effect"
A marvelous product of human creativity and patience, the Letts-Cravens technology can be compared only with the medieval, almost magical sword metallurgy (Balmung-Siegfried's sword, Toledo steel, Japanese swords). Unfortunately the authors could not attend the Workshop. When I read about the laser stimulation of the excess heat effect (*IE* #50), I had the impression that the complex multi-step processing of palladium (cold working, polishing, etching, annealing) actually breeds active zones and destroys the inactivated zones of the metal. Laser irradiation seems to stimulate some active zones and the locally released heat activates the adjacent ones. This is only speculation, but I have started a fruitful dialogue about this with the authors.

A. Lorusso, V. Nassissi, E. Filippo, M. Di Giulio, D. Manno, G. Buccolieri, and F. Celani (INFN, Frascati, Italy): "Modification of Pd-H_2 Thin Films Processed by UV Laser"
Pd films deposited on Si wafers were soaked with hydrogen and irradiated with an UV excimer laser. Remarkable modification of the Pd morphology and new elements were observed.

Lino Daddi (Accademia Navale, Livorno, Italy): "An Italian Precursor of the LENR Domain? The Nuclear Measurements of Don Borghi"
The author has studied the experiments performed by Don Borghi in the 1970s. A cold hydrogen plasma is treated with microwaves and the formation of neutrons via the reaction p+e is evaluated. The quantity of neutrons was evaluated via activation; U and Th were used. The experimental setup of Don Borghi had obvious weaknesses. However, the results seem to be relevant and important—the role of neutral particles in condensed matter nuclear science is, in my opinion, of paramount importance.

Saturday, March 20

William Collis: "Introduction"
The organizer presented us the evolution of these workshops and explained the program of the day. A record number of scientists attended this event (45), and some novel events, such as the duplication of John Dash's experiment by the students of Asti and the first *de facto* meeting of the International Society of Condensed Matter Nuclear Science, highlight the importance of this workshop. Actually this meeting marked the 15th anniversary of the 1989 cold fusion announcement of Pons and Fleischmann and, hopefully, a turning point in the history of this new branch of physics.

Yasuhiro Iwamura (Mitsubishi Heavy Industries, Hyogo, Japan): "Observation of Nuclear Transmutation Induced by Gas Permeation Through Pd Complexes"
The results of Iwamura, now reproduced in at least three other independent laboratories are, let's say, providential for the field of condensed matter. The transmutation, of Cs into Pr and of Sr into Mo, in quantities of nanograms for the time given, is beyond any doubt and it is reproducible. The quantity of the new element that resulted depended on the flux of deuterium. At the same time, these results are amazing and a great challenge for understanding—clusters formed by four deuterons (atomic number increases by 4, mass number by 8) seem to be some of the reactants. Akito Takahashi's theory provides a basis for this reaction. However, the role of the constituents of the complex that is evidently penetrated by deuterium is still unknown. The author told us that he will try new technical solutions for solving these puzzles.

Tadahiko Mizuno, Himoro Kenichi (Hokkaido University, Japan), Akito Takahashi (Osaka University, Japan), and Francesco Celani (INFN, Italy): "Neutron Emission from Low-Temperature D2 Gas

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in a Magnetic Field"
The authors have observed neutron emissions from pure deuterium gas after it was cooled in liquid nitrogen and compressed under a magnetic field! The neutron count, and duration of the release, and the time of the release after treatment all fluctuated considerably. Neutron emissions were observed in ten out of ten test cases. Normal hydrogen alone yields no neutrons. The experiment had been known by those working in the field for some time, but as far I know, there is no explanation for it. Stricto sensu, it is not a "cold fusion" or CMNS phenomenon, but it is another kind of formation of neutral particles in a magnetic field. I hope a synthesis of the existing theories will be able to explain more and more of the CF, LENR, CANR, and CMNS enigmas.

Akito Takahashi (Osaka University, Japan): "Deuteron Cluster Fusion and Ash"
This is clearly a successful theoretical model with many applications in the entire CMNS field. Deuteron clusters are a physical reality, 4D is confirmed in a spectacular way by the transmutation results of Iwamura. The hypothesized mechanism, EQPET (Electronic Quasi-Particle Screening Theory) is very plausible. I hope that the author will demonstrate non-palladium specific modalities for these reactions too, as well as help to show other condensed matter sites that are able to generate deuterium clusters. The Takahashi theory is one of the pillars of understanding in this complex field.

A. de Ninno, A. Fratolillo, A. Rizzo (ENEA, Frascati, Italy), E. Del Giudice (INFN, Milano, Italy): "^{4}He Detection During the Loading of Pd Cathodes"
Three experimental conditions are compared in an electrochemical study: 1) Pd cathode loaded with deuterium to the supercritical loading condition, x>1; 2) the same loaded under the critical loading condition, x<1; 3) the same loaded with hydrogen to the supercritical condition, x>1. Contamination with He was carefully avoided. Experiment 1) clearly shows a considerable release of He. A non-significant complication is induced by the somewhat greater He content in water (experiment 3) than in heavy water, therefore experiment 2) rather than 3) is the ideal blank.

E. Del Giudice (INFN, Milano, Italy), A. de Ninno, G. Liberti, A. Fratolillo (ENEA, Frascati, Italy): "Nuclear Transmutations in Cold Fusion Experiments"
A very high level theoretical paper, demonstrating (in plain words) that in the frame of the Preparata-DelGiudice-Bressani theory, such reactions are possible and take place in the coherence domains of condensed matter. As I stated in my talk, the Preparata theory has proved its predictive power.

Jean Paul Biberian (France): "Excess Heat During Co-deposition of Palladium and Deuterium Controlled by Mass Flow Calorimetry"
A very clever experiment with positive results. Heat release in excess was presented as well as an Mg transmutation experiment. Biberian, who is host and organizer of ICCF11, Marseille, October-November 2004, also presented the plan for the fall conference.

Fulvio Frisone (Italy): "Coherence QED in Cold Fusion within Micro-cracks of a D_2O-Loaded Lattice Deformation at Room Temperature"
Another fine theory paper: Using the Preparata theory, it is demonstrated that the fusion reactions are much enhanced in micro-cracks in metals. In fact, due to a screening potential generated there by d-electrons, the Coulomb thickness is reduced so that the fusion probability is increased. It is also an intuition-supported result. The creation of the Fulvio Frisone Foundation is a great achievement for CMNS and for Fulvio's many friends, *i.e.* the entire CF/CMNS community.

Xing Zhong Li (Tsinghua University, Beijing, China): "Anomalies Correlated with Abnormal Deuterium Flux and Heat Flow in D(H)/Pd Systems"
The importance of the deuterium flux in all CMNS phenomena cannot be overemphasized; therefore this is a very important work. Its abstract says: "Four anomalies are correlated with the abnormal deuterium flux in D/Pd systems: (1) the deuterium flux increases when D/Pd system is cooling down at certain temperature; (2) the energy released by each permeating deuteron is more than 120 eV; (3) the deuterium flux is enhanced when the number of the coating layers on the Pd film is increasing; (4) A mass 6 component appeared in the mass spectrum of the deuterium gas permeating through a hot Pd film. Selective resonant tunneling and "super absorption" theory are applied to explain these anomalies qualitatively." This explanation is based on the Preparata theory.

E. Campari, S. Focardi, V. Gabbani, V. Montalbano, F. Piantelli, S. Veronesi (Italy): "Overview on H-Ni Systems: Old Experiments and New Set-up"
The experimental set-up seemed to be the most promising cold fusion device in 1994-19955 and later it generated much disappointment—actually the second greatest after the Patterson device—in the history of cold fusion. The evolution of the devices and the materials used (Ni, Ni alloys) were presented in detail. It seems the first materials were the best, then the "spell" somehow got lost. Anyway, it is not over. The experimentation continues, combined with advanced material characterization; the hope for a hydrogen energy source is still alive.

Sunday, March 21, 2004

Franco Scaramuzzi (INFN, Frascati, Italy): "Gas Loading of Deuterium in Palladium at Low Temperature"
If cold fusion has a technological future, there are great chances that this will not be based on electrochemical loading of deuterium in palladium. The author, who created the very first gas-phase cold fusion system in April 1989, has performed new experiments that demonstrate that a high loading ratio of deuterium/hydrogen in palladium can be obtained via direct absorption at low temperature.

Francesco Premuda and Michele Pregnani (Italy): "New Mott Density Values for Degenerate Plasma Spots in Hydrogen/Deuterium Loaded Metals"
A very high level theoretical demonstration, presented in a very elegant manner; to understand it you need to be a plasma specialist. Please consult the PowerPoint presentation at the Asti site.

Vittorio Violante (ENEA, Frascati, Italy): "Nuclear Effects in Electrochemical Experiments"
A collaborative (ENEA, La Sapienza University, SRI) "grand" experiment for changes of isotopic composition, heat effects, and tritium formation performed on Pd and Ni thin-film cathodes. A weak X-ray emission during loading is correlated with anomalous isotopic shifts of some elements. After loading, the active electrode was irradiated with an HeNe (632.8 nm) laser under plasmons-polaritons resonant

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conditions. Clear heat excess and tritium above isotope enrichment is found for these conditions. The electrode system was electrolyzed for 40 minutes to load Ni with hydrogen, and then it was irradiated for three hours with the HeNe (632.8 nm) laser under plasmons-polaritons resonant conditions. Heat excess and tritium in quantities above isotopic enrichment was found. A bright paper, also producing optimism.

John Dash (Portland State University, U.S.): "Characterization of Palladium Cathodes After Electrolysis in Heavy Water"
A multi-author (Prof. Dash's coworkers and students), multidisciplinary, multi-analytical study of the morphological, metallurgical, textural, and isotopic changes of the electrodes used for long time CF/ISMNS experiments.

Arik El Boher (Energetics Technologies, Israel): "Intensification of Low-Energy Nuclear Reactions Through Superwave Excitation"
The exceptional efficiency of the "superwave" excitation in many cold fusion experiments is demonstrated. Superwaves or "waving waves," are stimulating heat excess in glow discharge cells—up to 6.7 times the input energy; a "heat after death" effect was also observed. The rate of D-loading into Pd was higher when driving electrolytic cells with superwaves than when using DC; tritium in excess is also obtained. Unfortunately, no excess heat at all has been obtained so far in catalytic cells. Successful loading of Pd target with D was obtained in the high pressure/high temperature gas cell without going through the alpha + beta phase. It is known that the dynamic factor is vital for the success of the CMNS experiments; these waving waves are doing an excellent job, what I would call "quadratic dynanism."

Michael McKubre (SRI International, U.S.): "Conditions for Cold Fusion"
High loading of D in Pd is considered a first, *sine qua non*, condition for obtaining excess heat production in Pd wire cathodes; McKubre and his collaborators have demonstrated this with hundreds of experiments. The second condition, initiation (*i.e.* maintaining this high loading for long times), say 20 to 50 times the loading time is also demonstrated, however its role has not been explained until now on a clear causal basis. Stimulation of the effect needs a sufficiently high current density; a high flux of deuterium, *i.e.* disequilibrium. Different methods of sealing the high loading as thin metal (gold) deposition are studied as well as other methods of triggering the effect in these sealed cathodes. A successful laser stimulation experiment was presented.

Francesco Celani (INFN, Frascati, Italy) and 20 Co-authors: "Problematics Related to Th-Hg Salts in Cold Fusion Experiments"
Celani and his team have established a new trend working with deuterated hydroalcoholic solutions made slightly acid and with additions of Th and Hg salts in low concentrations—a very complex environment able to generate results that are very interesting for understanding the processes and interactions in CMNS experiments. They have already reproduced Iwamura-style transmutations in electrochemical experiments. This and other data compensates for the fact that this set-up is, at a first sight, not ideal for heat generation. However, the new Celani system is important for fundamental understanding.

E. Campari, S. Focardi, V. Gabbani, V. Montalbano, F. Piantelli, and S. Veronesi (Italy): "Surface Analysis of Hydrogen-Loaded Nickel Alloys"
A very thorough metallurgical study that gives an image of the extent of this important research—complimentary to the other paper presented at this symposium.

Roberto Monti and Gerardina Cesarano (Italy): "Low-Energy Transmutations"
Monti elaborated in 1988 his Alpha Extended Model of the atom and has used it for different transmutation experiments. Those performed in 1992 are the best known. For details, please see: http://www.lowenergytransmutations.org.

Antonio Spallone (INFN, Frascati, Italy): "A Method to Achieve H/Pd=1: A Review of Ten Years of Studies"
An impressive research effort and creativity that has lead to a know-how thesaurus of CMNS. Both loading from (heavy) water and from alcohol based solutions are presented.

More on the Asti Workshop, and Proposals for the Newly-Founded International Society

Michael McKubre

I have just returned from two meetings in Italy; one in Asti and the other in Frascati. Since these were important meetings, both scientifically and societally, I thought I would make a summary and report to the U.S. community. Only John Dash was present with me in Asti and I attended the Frascati meeting as the "solo Americano."

Focusing first on science: Dr. Iwamura (MHI) gave two excellent talks on the isotope mutation effects—the one at INFN Frascati being more extended and with more time for questions. These were similar to his results presented in Cambridge at ICCF10, but the work is becoming even more compelling as he and his team work through the systematics and uncertainties and do more experiments to observe physical trends. MHI is presently collaborating with NRL to replicate their study. This work is also supported by results of Ni to Cu transmutation being obtained by Dr. Violante at ENEA Frascati—just across the road. I had the opportunity to spend the day with Dr. Violante and his team, including some excellent students. In addition to the laser-stimulated NiH transmutation experiments, this group is also working to follow up the Case heat-helium results that we reported on in Lerici. The Energetics (Israeli) group presented a summary of results at both Asti and Frascati. I think that the Energetics glow discharge work has produced the most important new heat results in the field in recent years, particularly in terms of scale-up towards a practical device. Their work on novel waveforms for D and H loading and heat generation also has enormous potential significance.

Many beautiful results were presented at Asti, the most remarkable by Dr. Mizuno (who has often stunned me with the elegance and unexpectedness of his results). He reported a clear signal of neutrons from a small pyrex tube containing nothing except D2 gas in a strong magnetic field at liquid nitrogen temperatures. Unless the walls are involved it is very hard to see how this can be a coherent effect. But the system is so simple that it is harder to see how this could be measurement error—and even harder to imagine how this could be a result of two-body "hot" fusion. Stay tuned.

At Asti, medals newly minted to honor Giuliano Preparata were awarded by the chairman of the local organizing committee, Dr. Francesco Celani, to Drs. Iwamura, Mizuno, and Antonella de Ninno. A medal was also voted for Peter

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Hagelstein, who was unable to be present as he was helping Scott Chubb defend the fort at the APS meeting in Montreal.

One of the primary purposes of conducting this (possibly last?**) Asti conference was to begin to tackle the tasks of creating a "Condensed Matter Nuclear Science" International Society. Most will know that the Cambridge (10th) meeting of the ICCF steering committee (the only International organizing body our community has had to date) appointed Scott Chubb and Vittorio Violante to begin the process of organizing an International society ultimately to control the conference series, the Journal, and anything else we choose to pursue. At this same time Peter Hagelstein was asked to enact and edit the new Journal (first issue due soon), and Jean Paul Biberian was accepted as Chairman of ICCF-11.

The Giuliano Preparata Medal.

Unfortunately, organizing the legal and logistical details of a fledgling International Society is a lot of work of a type rather different from that normally undertaken by cold fusion researchers. Since August 2003 this task has been worked on largely by Bill Collis with support from the Italian community: Francesco Celani, Antonio Spallone, and Vittorio Violante. All are to be greatly thanked and congratulated for their effort. The idea is to incorporate a society to provide legal protection for its officers, to wield bank accounts, to solicit funding, support conferences, student travel, etc. There are many good reasons for this, eloquently described by Bill in Asti. He has or shortly will incorporate the society in England (also for sufficient and explained reasons). For details you should contact Bill or look at the website http://www.iscmns.org/news.htm.

A society needs a president and two very fine candidates were presented: Professors Xing-Zhong Li and Akito Takahashi. It is a measure of their stature that the vote was as close as it could be to a dead heat in the 34 cast. As a result of this voting, Prof. Takahashi will be the founding president of the "ISCMNS" and Prof. Li will be our first Vice President.

The new society also plans to have an Executive Committee to assist with specific tasks, and provide overall guidance and continuity. We did not vote members to this committee, although there was some discussion of it. An important goal in forming the new society is that we all feel part of it; to do this we need more thought and more discussion than so far has been possible. However, we needed somebody to do something, and Bill has made an excellent start. We also need to preserve flexibility so that we can all be proud to participate and contribute. I urge you all to read through the proposed constitution, volunteer members for the Executive Committee, make suggestions of features that you would like included or not.

In terms of the Executive Committee, it seems that we really already have a good one to take us to ICCF11, where we can constitute a formal body. Scott Chubb and Vittorio Violante were asked at ICCF10 to do this job, so they already "were" the committee. Likewise Peter Hagelstein as outgoing conference Chairman and Editor of the Journal, and Jean Paul Biberian as incoming Chairman must be included on the committee, and is my proposal (here) that those titles be always represented on the Executive Committee to support the President (Akito Takahashi) and Vice President (Xing-Zhong Li). It is also very clear that Bill Collis must be on the Executive Committee as Secretary (and Treasurer?). He is almost singlehandedly responsible for getting us this far and is the only one of us to have demonstrated the drive and skills to get the tasks done. A full and new voting will occur in Marseilles, but if we don't support Bill I believe this effort will flounder.

With this committee we demonstrate a very good International character and have represented: the U.S., Italy, France, Japan, China, and the UK. I feel we do need to expand and enforce this Internationalism, and the National representatives should take on the responsibility of communicating their committee and society activities in their home countries. In terms of expansion, I feel we need to select representatives from Russia and Israel, and it will be important in the future to have representation from Germany and/or Eastern Europe. All of us need to think how this committee should be constituted, how big it should be, how numerously the different nations should be represented, what the assigned tasks should be, etc. This committee will really decide the future of our society.

In terms of added features, I have a suggestion that I want to discuss further. I would like to propose a bicameral Executive Committee with an upper body constituted to increase the society stature and recognize the past contributions of our most senior members. The people from overseas who spring to mind immediately are Martin Fleischmann, Franco Scaramuzzi, and Yoshiaki Arata. These men all have the highest stature in the world of science, that I hope they would agree to lend to our new society. They also have all made fundamental contributions to the development of condensed matter nuclear science that simply must be recognized, and we would greatly benefit from their wisdom. If you agree with the principal, I invite you to consider others in this category. There are one or two from the U.S. whom I would like to see in this role, although the numbers should be few since the necessary stature must be very high, and working members should be selected for the regular Executive Committee.

As a final point, the functioning of our fledgling society must be completely transparent to avoid rancor and suspicion. I believe there should be no secrets—not even in voting. Bill Collis is in the process of implementing a system of electronic communication so all can be informed and involved. I encourage you all to participate strongly and enthusiastically to make a society that works—for the benefit of all.

**The Asti meeting originally was a small working group sponsored by Fiat. A prize was presented (a head sized truffle). Much food and wine were consumed. After Fiat reduced, then dropped, their sponsorship, Bill Collis was able to secure support from a local bank, and with a great deal of work on his part, and remarkable success, he has transformed the workshop into a small conference that has received a considerable following primarily from the Italian and Japanese cold fusion workers. Rather than continuing to rely on Bill's good will and hard work, the idea is to incorporate the conference as an "International Society" activity. The reason to hold it always in Asti now is lost and Dr. Fulvio Frisone has volunteered to consider including the next meeting under the aegis of his Foundation newly created by the Sicilian government to study in the area of CMNS. This is a very generous offer, and a very good idea.

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The Techno Maestro's Amazing Machine:

Kohei Minato and the Japan Magnetic Fan Company

A maverick inventor's breakthrough electric motor uses permanent magnets to make power—and has investors salivating

John Dodd

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When we first got the call from an excited colleague that he'd just seen the most amazing invention—a magnetic motor that consumed almost no electricity—we were so skeptical that we declined an invitation to go see it. If the technology was so good, we thought, how come they didn't have any customers yet?

We forgot about the invitation and the company until several months later, when our friend called again.

"OK," he said. "They've just sold 40,000 units to a major convenience store chain. Now will you see it?"

In Japan, no one pays for 40,000 convenience store cooling fans without being reasonably sure that they are going to work.

Kohei Minato

The Maestro

The streets of east Shinjuku are littered with the tailings of the many small factories and workshops still located there—hardly one's image of the headquarters of a world-class technology company. But this is where we are first greeted outside Kohei Minato's workshop by Nobue Minato, the wife of the inventor and co-director of the family firm.

The workshop itself is like a Hollywood set of an inventor's garage. Electrical machines, wires, measuring instruments, and batteries are strewn everywhere. Along the diagram-covered walls are drill presses, racks of spare coils, Perspex plating, and other paraphernalia. And seated in the back, head bowed in thought, is the 58-year-old techno maestro himself.

Minato is no newcomer to the limelight. In fact, he has been an entertainer for most of his life, making music and producing his daughter's singing career in the U.S. He possesses an oversized presence, with a booming voice and a long ponytail. In short, you can easily imagine him onstage or in a convertible cruising down the coast of California—not hunched over a mass of wires and coils in Tokyo's cramped backstreets.

Joining us are a middle-aged banker and his entourage from Osaka and accounting and finance consultant Yukio Funai. The banker is doing a quick review for an investment, while the rest of us just want to see if Minato's magnetic motors really work. A prototype car air conditioner cooler sitting on a bench looks like it would fit into a Toyota Corolla and quickly catches our attention.

Seeing is Believing

Nobue then takes us through the functions and operations of each of the machines, starting off with a simple explanation of the laws of magnetism and repulsion. She demonstrates the "Minato Wheel" by kicking a magnet-lined rotor into action with a magnetic wand.

Looking carefully at the rotor, we see that it has over 16 magnets embedded on a slant—apparently to make Minato's machines work, the positioning and angle of the magnets is critical. After she kicks the wheel into life, it keeps spinning, proving at least that the design doesn't suffer from magnetic lockup.

She then moves us to the next device, a weighty machine connected to a tiny battery. Apparently the load on the machine is a 35kg rotor, which could easily be used in a washing machine. After she flicks the switch, the huge rotor spins at over 1,500 rpms effortlessly and silently. Meters show the power in and power out. Suddenly, a power source of 16 watts or so is driving a device that should be drawing at least 200 to 300 watts.

Nobue explains to us that this and all the other devices only use electrical power for the two electromagnetic stators at either side of each rotor, which are used to kick the rotor past its lockup point then on to the next arc of magnets. Apparently the angle and spacing of the magnets is such that once the rotor is moving, repulsion between the stators and the rotor poles keeps the rotor moving smoothly in a counterclockwise direction. Either way, it's impressive.

Next we move to a unit with its motor connected to a generator. What we see is striking. The meters showed an input to the stator electromagnets of approximately 1.8 volts and 150mA input, and from the generator, 9.144 volts and 192mA output. 1.8 x 0.15 x 2 = 540mW input and 9.144 x 0.192 = 1.755W out.

But according to the laws of physics, you can't get more out of a device than you put into it. We mention this to Kohei Minato while looking under the workbench to make sure there aren't any hidden wires.

Minato assures us that he hasn't transcended the laws of physics. The force supplying the unexplained extra power out is generated by the magnetic strength of the permanent magnets embedded in the rotor. "I'm simply harnessing one of the four fundamental forces of nature," he says.

Although we learned in school that magnets were always

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bipolar and so magnetically induced motion would always end in a locked state of equilibrium, Minato explains that he has fine-tuned the positioning of the magnets and the timing of pulses to the stators to the point where the repulsion between the rotor and the stator (the fixed outer magnetic ring) is transitory. This creates further motion—rather than a lockup.

Real Products

Nobue Minato leads us to the two devices that might convince a potential investor that this is all for real.

First, she shows us the cooling fan prototype that is being manufactured for a convenience store chain's 14,000 outlets (three fans per outlet). The unit looks almost identical to a Mitsubishi-manufactured fan unit next to it, which is the unit currently in wide use. In a test, the airflow from both units is about the same.

The other unit is the car air conditioning prototype that caught our eye as we came in. It's a prototype for Nippon Denso, Japan's largest manufacturer of car air conditioners. The unit is remarkably compact and has the same contours and size as a conventional unit. Minato's manufacturing skills are clearly improving.

The Banker and His Investment

Minato has good reason to complain about Japan's social and cultural uniformity. For years, people thought of him as an oddball for playing the piano for a living, and bankers and investors have avoided him because of his habit of claiming that he'd discovered a breakthrough technology all by himself—without any formal training.

However, the Osaka banker stands up after the lecture and announces that before he goes, he will commit $100 million to the investment pool.

Minato turns to us and smiles. We brought him good luck, and this was his third investor in as many weeks to confirm an interest.

Bringing the Tech to the Table

With the audience gone, we ask Minato what he plans to do to commercialize the technology. His game plan is simple and clear, he says. He wants to retain control, and he wants to commercialize the technology in Japan first—where he feels he can ensure that things get done right. Why doesn't he go directly to the U.S. or China? His experiences in both countries, he suggests, have been less than successful. "The first stage is critical in terms of creating good products and refining the technology. I don't want to be busy with legal challenges and IP theft while doing that."

Still, the export and licensing of the technology are on his agenda, and Minato is talking to a variety of potential partners in other countries.

Whereas another inventor might be tempted to outsource everything to a larger corporation, part of what drives Minato is his vision of social justice and responsibility. The 40,000 motors for the convenience store chain are being produced by a group of small manufacturers in Ohta-ku and Bunkyo-ku, in the inner north of Tokyo—which is becoming a regional rust belt. Minato is seized with the vision of reinvigorating these small workshops that until the 1980s were the bedrock of Japan's manufacturing and economic miracle. Their level of expertise will ensure that the quality of the motors will be as good as those from any major company.

International Prep

Despite his plan to do things domestically first, Minato is well prepared for the international markets. He is armed with both six years of living and doing business in Los Angeles in the early 1990s—and with patent protection for over 48 countries. His is hardly a provincial perspective.

His U.S. experience came after playing the piano for a living for 15 years. He began tinkering with his invention in the mid-1970s. The idea for his magnetic motor design came from a burst of inspiration while playing the piano.

But Minato decided to drop everything in 1990 to help his daughter Hiroko, who at the age of 20 decided that she wanted to be a rhythm and blues star in the U.S. Minato is a strong believer in family: If Hiroko was going to find fame and fortune in the U.S., Dad had better be there to help manage her. He succeeded in helping Hiroko to achieve a U.K. dance chart number one hit in 1995.

In 1996 Minato returned to Japan and his magnetic motor project. The following year he displayed his prototypes to national power companies, government officials, and others at a five-day conference in Mexico City. Interest was palpable, and Minato realized that his invention might meet a global need for energy-saving devices.

Subsequent previews and speeches in Korea and Singapore further consolidated his commitment to bringing the invention to fruition, and he was able to bring in several early-stage investors.

During the late 1990s, Minato continued to refine his prototypes. He also stayed in constant contact with his lawyer, registering patents in major countries around the world. Through his experiences in the U.S. he realized that legal protection was critical, even if it meant delaying release of the technology by a couple of years.

Ironically, by the time he'd won patents in 47 countries, the Japanese patent office turned him down on the grounds that "[the invention] couldn't possibly work" and that somehow he was fabricating the claims.

But a few months later they were forced to recant their decision after the U.S. patent office recognized his invention and gave him the first of two patents. As Minato notes: "How typical of Japan's small-minded bureaucrats that they needed the leadership of the U.S. to accept that my invention was genuine."

By 2001, the Minatos had refined their motors and met enough potential investors to enter into a major international relationship, initially with a Saudi company, to be followed thereafter by companies in the U.S. and elsewhere.

However, fate dealt the investors and Minato's business a serious blow when the World Trade Center was attacked in New York. The Saudis retreated, and Minato's plans fell back to square one.

Now Minato is once again ready to move. With the first order in the works and more orders pending successful prototypes, he has decided that investors don't have to be primary partners. He is actively accepting inquiries from corporate investors who can bring strategic advantages and corporate credibility with them. His company, Japan Magnetic Fan, will make a series of investment tie-up announcements in the first and second quarters of 2004.

Implications

Minato's motors consume just 20% or less of the power of conventional motors with the same torque and horse power.

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They run cool to the touch and produce almost no acoustic or electrical noise. They are significantly safer and cheaper (in terms of power consumed), and they are sounder environmentally.

The implications are enormous. In the U.S. alone, almost 55% of the nation's electricity is consumed by electric motors. While most factory operators buy the cheapest motors possible, they are steadily being educated by bodies like NEMA (National Electrical Manufacturers Association) that the costs of running a motor over a typical 20-year lifespan comprise a purchase price of just 3% of the total, and electricity costs of 97%. It is not unusual for a $2,000 motor to consume $80,000 of electricity (at a price of .06 cents per kilowatt hour).

Since 1992, when efficiency legislation was put into place at the U.S. federal level, motor efficiency has been a high priority—and motors saving 20% or so on electrical bills are considered highly efficient. Minato is about to introduce a motor which saves 80%, putting it into an entirely new class: The $80,000 running cost will drop to just $16,000. This is a significant savings when multiplied by the millions of motors used throughout the U.S. and Japan—and eventually, throughout the world.

The Devices

Minato's invention and its ability to use remarkably less power and run without heat or noise make it perfect for home appliances, personal computers, cellphones (a miniature generator is in the works), and other consumer products.

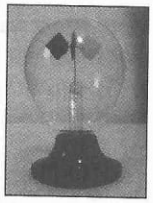
The magnetic motor will be cheaper than a standard motor to make, as the rotor and stator assemblies can be set into plastic housings, due to the fact that the system creates very little heat. Further, with the motor's energy efficiency, it will be well suited for any application where a motor has limited energy to drive it. While development is still focused on replacing existing devices, Minato says that his motor has sufficient torque to power a vehicle.

With the help of magnetic propulsion, it is feasible to attach a generator to the motor and produce more electric power than was put into the device. Minato says that average efficiency on his motors is about 330%.

Mention of over-unity devices in many scientific circles will draw icy skepticism. But if you can accept the idea that Minato's device is able to create motion and torque through its unique, sustainable permanent magnet propulsion system, then it makes sense that he is able to get more out of the unit than he puts in in terms of electrical power. Indeed, if the device can produce a surplus of power for longer periods, every household in the land will want one.

"I am not in this for the money," Minato says. "I have done well in my musical career, but I want to make a contribution to society—helping the backstreet manufacturers here in Japan and elsewhere. I want to reverse the trends caused by major multinationals. There is a place for corporations. But as the oil industry has taught us, energy is one area where a breakthrough invention like this cannot be trusted to large companies."

Minato was once close to making a deal with Enron. But today, he is firmly on a mission to support the small and the independent—and to go worldwide with them and his amazing machine. "Our plan is to rally smaller companies and pool their talent, and to one day produce the technology across a wide range of fields."



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Translation in Space by Rotations

Remi Cornwall*

Abstract

A new means of non-photonic electromagnetic propulsion is discussed both theoretically and practically. A history of the problem is carried out, pointing out the common pitfalls in the pure experiment line of reasoning adopted by many inventors. We note the problems of all mechanical systems, such as rockets and ion engines. All claims of oscillating/pendulating masses claiming free-fall propulsion are hopefully dismissed by a survey of the pitfalls inventors present themselves—we hope that this will form a useful reference at least. Then we look at nascent electromagnetic propulsion ideas—photonic propulsion/light sails. We ask if the large energy requirement for electromagnetic propulsion can be overcome by using other electromagnetic phenomena apart from radiative pressure. The hidden momentum trap is pointed out for ExB devices and a new device is presented and analyzed using a well-known phenomena that seemingly doesn't violate the present laws of physics. Finally we present quantitatively an intuitive model using the electrodynamics formalism to ask how this might be possible and not violate conservation laws that are central to the fabric of space-time we occupy.

Introduction

Flight and space travel isn't easy. These are high speeds, high aerodynamic forces, immense airframe pressures from the tenuous air or vacuum outside the craft and the pressure within, high temperatures, and volatile fuels. Indeed, we find much of the craft is given over to present day "peculiarities" of solution of the flight problem--wings, expensive high specification engines operating at high temperatures, and large tanks for fuel taking up much space and weight, increasing drag and reducing range.

Our problem is Newton's Third Law, which on a more profound level[1] (see also Appendix 1) can be understood as due to the isotropy of space. There is no free ride in space; wherever one performs an experiment, if one shoots a gun into a block of material and finds that the bullet embeds and the block moves a small distance, it has got to happen the same elsewhere (translational invariance leads to conservation of linear momentum) and similarly if the experiment was rotated (conservation of angular momentum).

Countless observations find that we move forward by pushing against something else, the other object recoiling or barely moving if it has large mass. Either we have a short range/time energetic mass ejection system limited in both energy and matter but with much thrust, or a long range/time mass ejection system with very little thrust, such as the ion engine.

In space flight usually energy is not a consideration as we can contend with putting heavy or unsafe nuclear reactors in the craft, but we run out of propellant. Relativity theory by mass-energy equivalence presents us with the possibility of converting our energy into propellant matter, but the exchange rate for this transaction is prohibitive. Relativity[4] gives us this relation between energy and momentum:

$$\frac{\vec{p}}{E} = \frac{\vec{v}}{c^2} \tag{1}$$

To gain the biggest amount of momentum for our energy input it is best if our propellant leaves its "nozzle" at light speed. This is the principle of photonic propulsion, such as by laser rocket or light sail, however approximately 3×10^8W is needed to give a force of 1N!

Intuitively, and that's how ideas start, we need to have something to push against *wherever* we are that could be said to have some kind of mass-energy. If we could couple to some phenomena that would allow this, energy wouldn't really be an issue because our power sources are quite compact and long lasting. We could expect great range in reasonable time and at least interplanetary travel would become commonplace. The only phenomenon that presents itself to current engineering toolsets is electromagnetism, we believe. This force has the necessary long range, strength, and commonplace engineering methods to utilize.

To proceed we shall survey devices that are non-starters and give reasons to hopefully guide co-researchers; some are very seductive but flawed by often subtle effects. The sections are as follows: Oscillating Masses Can Fool the Wary; ExB Devices and Hidden Momentum; Dynamic ExB Devices Are Really Just Antennas; Feynman's Disk; Translation in Space by Rotations; Early Thoughts on Implementation and Engineering of Proposed Propulsion; Conclusion; Appendici.

Oscillating Masses Can Fool the Wary

There is a hard-core group of people who convince themselves that free propulsion in space is possible by some means of rotating masses. Some are gifted amateurs who, as they see it, are unencumbered by schooling and "personality and thought oppression" of the education system; others are highly trained individuals who have often passed high into the science establishment but observe some effect and maybe suspend some critical facility. We are not knocking these brave people, because more often than not progress is made by the Maverick. However, we (in the consensus sense) feel sure that the *core issue* is not being attacked—that of conservation of momentum or, more graphically, action-reaction. No one has shown how some system of masses can have one half of the action-reaction pair somehow removed. The NASA website "Breakthrough Propulsion Physics"[1] has some interesting summaries of the pitfalls and categorization of devices; a mechanism appealing to conventional ideas has always been found. Most commonly the devices operate and display a differential friction effect whereby a mass in an asymmetric cycle (fast, slow) somehow presses down less on the chassis (and through to the surface as no one ever does these in free-fall) in part of the cycle generating less normal reaction force and less friction and hence net movement.

We observed another type of motion whilst consulting in

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a project coming from an horizontal component of force from reaction forces. What was happening in this case was a to-and-fro motion like waving one's arms in a fore and aft flapping fashion; the center of mass of the masses and the chassis was then shifting back and forth. The inventor said it couldn't possibly be friction because he'd done it on ice, an air table, and suspended from a pendulum whereupon it stayed to one side. A little thought makes one realize that it operates in principle as a person punting themselves across an ice rink with a pole: the pole is in compression and one can resolve this force into a normal reaction and a *horizontal component*.

ExB Devices and Hidden Momentum

References 3 and 4 give a good account and "derivation" of the Poynting Vector. It has the most satisfactory form and other attempted derivations give rise to physical effects that just don't exist. Nevertheless, the form that is accepted by everyone leads to some wacky consequences that people didn't quite believe and pushed under the mat as a backwater of classical electrodynamics. The Feynman disk (next section) allows *angular* translation through space, the mechanical part being balanced by the electromagnetic part. Experiment to show this was done in recent times[5] and we shall discuss this more in the next section where we develop the ideas around our postulated device.

Recently (fifty years ago) people started wondering if linear translation might be possible by such a scheme. Naively people considered a solenoid producing a static magnetic field with a static electric field at right angles to its axis by some other means (Figure 1). According to theory this should have a continual flow of momentum orthogonal to the electric and magnetic fields, though on greater analysis this is not so. Reference 6 gives an account by Puthoff, Ibison, and Little and further references of hidden momentum, which is a relativistic effect concerning the motion of the charge carriers generating the magnetic field. In a nutshell, those charges at high potential in the superimposed electric field have more potential energy and hence more mass. This "hidden" effect and the mechanical momentum from it *always* just balance that from the Poynting flow. References 7 and 8 give more detail, with Reference 8 giving a particularly elegant derivation done a few years ago showing that there is life in "old" physics, least where people aren't bothered to look or that old theories and concepts need polishing, review, and re-presentation.

Dynamic ExB Devices Are Really Just Antennas

Following on from the static devices many have been fooled into thinking that if this mechanism of hidden momentum could be defeated then we would have a propulsion device. Somehow in the mind's eye of the inventor it was seen that the constant electric field superimposed on the magnetic field from the solenoid needed to be replaced with one circulating around it. Figure 1 is borrowed from the Puthoff, Ibison, and Little account[6] and shown "morphed" on the right-hand side as a bulbous shape with movement in the bulbous direction.

Of course, this circulating field would be achieved by changing the magnetic field. The belief system is that field energy of the antenna (to give its correct name!) near-field, sloshing around, is much greater than radiated energy (true) and that when field energy impinges, momentum is imparted in one sense and when it leaves is again imparted in the same sense. Very involved calculations can be done but a moment's thought tells us that once the power supply is included in the set up, the momentum from the antenna near-field will cancel and only the puny E/c force from the radiation field will result. Try as we might, placing the power supply at right angles, having the power supply symmetrical, the wires and field will eventually converge on the antenna structure taking up its geometry. We rely on the asymmetrical flow of energy to the antenna to generate net propulsion but at some point the wires
feeding it will have the same asymmetric geometry. The energy flowing from one system to the other and hence the momentum will cancel. The radiated momentum dominates; we have just a photon rocket.

Feynman's Disk

Field momentum has long been acknowledged, certainly for radiation. What has been contentious is field momentum in "static" situations when there is no transmission of wave energy—so called induction fields. Richard Feynman gave a thought experiment to illustrate the point[3] in the form of a non-conducting disk (see Figure 2) with charged electric balls at the periphery. At the center a solenoid set up an axial field. The apparent paradox is to explain what the disk will do when the solenoid is switched off: a radial electric field will react against the electric field of the balls on the periphery leading to a torque. However, according to the design the disk is suspended with nothing to react against and this seems to violate conservation of momentum.

Reference 5 is a short paper describing how this experiment was carried out in comparatively recent times.

Appendix 2 covers in the most fundamental form the derivation of field momentum concepts from the action of the field and particles. Conservation of momentum is expressed

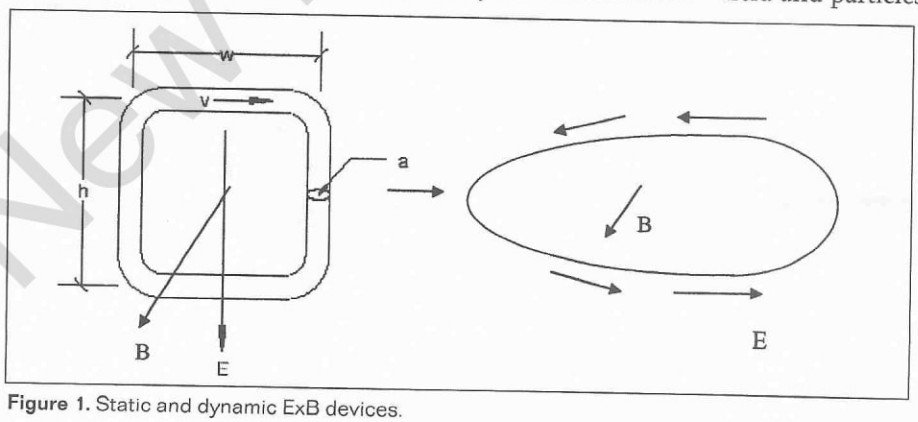

Figure 1. Static and dynamic ExB devices.

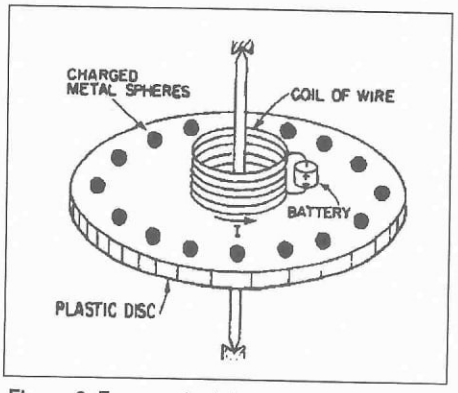

Figure 2. Feynman's disk.

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(Appendices 1 and 2) by:

$$\sum_n \frac{\partial L}{\dot{q}} = 0 \tag{2}$$

That is the sum of partial differentials of the Lagrangian with respect to velocity of generalized co-ordinates for the system is zero. For the field and a particle density ρ_m and working with the Lagrangian "density" this reduces to:

$$\rho_m \dot{v} - \rho \mathbf{E} - \mu_0 \mathbf{J} \times \mathbf{H} - \nabla \cdot T + \frac{\partial}{\partial t} \varepsilon_0 \mu_0 \mathbf{E} \times \mathbf{H} = 0 \tag{3}$$

We understand the second and third terms to be the usual Lorentz force but the terms four and five come from the action of the field S_f, which we do not take as a given and so enter the variation (Appendix 2). "T" is the Maxwell Stress Tensor that on taking the divergence ("contraction") leads to a component of the 3-vector of force. Overall the last term (Poynting vector) and the Stress Tensor come from the Stress-Energy Tensor that is derivable from the Electromagnetic Field Tensor (Appendix 2). The 3-vector form is less elegant but more expressive to the engineer.

If we integrate the above expression over all space the Maxwell Stress term vanishes so that the Lorentz term is only balanced by the Poynting term—apparently too with static or induction fields. The last term was accepted and understood to be the reaction force on the particles due to radiation. However, with the Feynman disk thought experiment the implication was that the field was some kind of fluid body taking up the opposite momentum to the mechanical part.[5] This was seen as some backwater of classical electrodynamics that people brushed under the mat and only recently was the experiment performed.[5]

The Feynman disk will rotate *in vacuo* when the field is switched on, translate angularly and stop when the field is switched off. Nature seems to allow this because it happens at a point in space and the field momentum and mass momentum cancel. Nature isn't caught with her bloomers down it seems.

In the next section we ask if we can somehow turn this known angular translation into a linear translation.

Translation in Space by Rotations

What are the necessary conditions to achieve a proper translation in space by rotation? Can it be possible? Consider the rod in Figure 3, with two masses at its end. The rod and baton is of length L to the ball centers. Drawn is a dotted line, which isn't a physical device, to the center of the effect causing the rotation (distance R from mass m_1); as we shall see, this isn't the same as the system center of rotation at point distance r from mass m_f. The mass m_f is meant to represent the mass of the electromagnetic field we set up.

We shall prove simply that:

- The Center-of-the-Effect-Causing-Rotation (CECR) is not the same as the System-Center-of-Rotation (SCR).
- Placing the CECR on the baton only results in rotation about the SCR and hence no translation.
- The CECR when placed outside of the baton and given at least some mass (m_f) allows a rotation about point "r", that being on a greater diameter can allow translation through space on two such rotations (one on the left hand side then one on the right hand side).

Taking moments about SCR (point "r"):

$$m_f r = m_1(R - r) + m_2(R - r + L)$$
$$\Rightarrow \tag{4}$$
$$r = \frac{(m_1 + m_2)R + m_2 L}{m_f + m_1 + m_2}$$

- We can prove the first bullet point by noting that if all the masses and distance are finite and positive, "r" is non-zero and doesn't lie at the CECR.
- If we set R to zero, that is place the CECR on the baton, the SCR must lie somewhere on the baton dependent on the masses.
- If R is positive and m_f finite then the CECR must lie outside of the baton and the SCR is outside of the baton too.

To this last point we can calculate the force "field" around the baton. At Point m_1:

$$f_{m_1} = \frac{\tau(m_f + m_1 + m_2)}{Rm_f - Lm_2} \tag{5}$$

At Point m_2:

$$f_{m_2} = \frac{\tau(m_f + m_1 + m_2)}{(R + L)m_f + Lm_1} \tag{6}$$

Taking the case when baton masses are equal, and the CECR is outside of the baton (R>0) clearly the two expressions are not equal (in magnitude) if we attribute some mass to the field. Otherwise the forces are equal and opposite and just form a couple with the SCR within the baton.

If we use two such rotations on either side of the baton (one anti-clockwise the other clockwise) the illusion of distant rotation is complete. The necessary centripetal forces causing the rotation place the baton in tension but we can assume it is rigid. The torque forces sum and act in the same

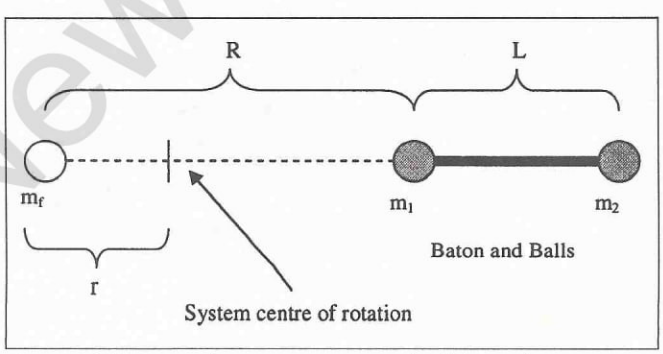

Figure 3. Effecting a distant rotation outside of the craft $m_1 m_2$.

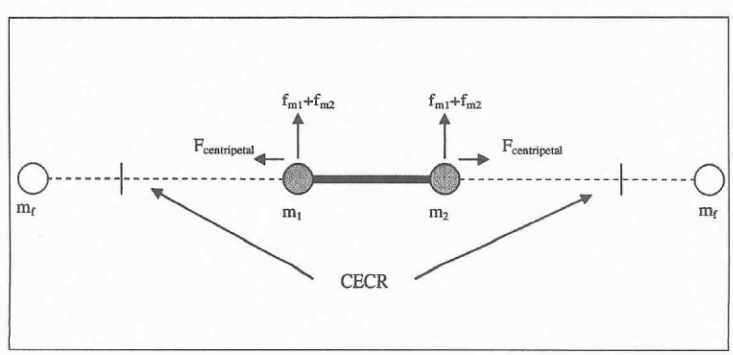

Figure 4. Translation in space by two external rotations.

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direction forming a *translational* force (see Figure 4).

We envision forming two "virtual" Feynman disks by having arc sections on the craft that would be part of a greater disk whose center is physically outside of the craft (see Figure 5).

The forces all resolve to give the illusion of the greater disks and rotation about a distant point, as we can see by the earlier diagram. A real rotation caused by say two fixed electric motors (bolted to the ground) outside of the baton would compete and place the baton in tension. Equilibrium would be reached whereby the tension in the baton would resolve equal and opposite the torque forces—it would rotate a short way. In the propulsion case our "stator" is the electromagnetic field itself and, not being fixed to anything, would be "dragged" and rotated. We calculate these forces (Appendix 3), which amount to radiation resistance but note that their order of magnitude is $1/c^3$ down on acceleration effects produced by rate of change of the Poynting Vector and so are negligible.

As we shall see shortly, most of the field's mass is in the magnetic part and this can be made to appear outside of the craft by the following arrangement (Figure 6), so the Feynman disks are not "virtual" but really do exist in space outside the craft. The force that the electrets experience is not merely a body force reacting against the solenoids because axial symmetry does not permit this[5]; the force is really in reactance to the field momentum. Also it matters not that the fields are generated by solenoids on the craft, electrodynamics is *field formulated* and the sources do not exert influence by spooky action at distance—Nature cuts her apron strings from the fields once they are propagated, they exist in their own right. All that matters is the arrangement of the fields.

We note that the Feynman disk received an angular impulse when the field was switched on: it rotated and then received the opposite impulse when the field was switched off. Overall it had angularly translated a distance in space. The effect is very feeble and one-shot operation on our linear translation scheme would result in a little kick at the journey's start and a little brake at its end.

Let us proceed on the basis that the time average of the Poynting force (cross product term Equation 3) can be made non-zero (more on this later) and calculate the magnitude of these forces and see the effect of variation of parameters such as radial distance to CECR, field strength, the length of the arc-section in the craft, etc. We aim for simplicity and a ballpark figure so we make approximations:

First let us sum Equations 5 and 6 ($m_1 = m_2 = m$) to get the total force:

$$f = -\frac{\pi m_f (2m + m_f)(2R + L)}{(Lm - Rm_f)(Lm + Lm_f + Rm_f)} \tag{7}$$

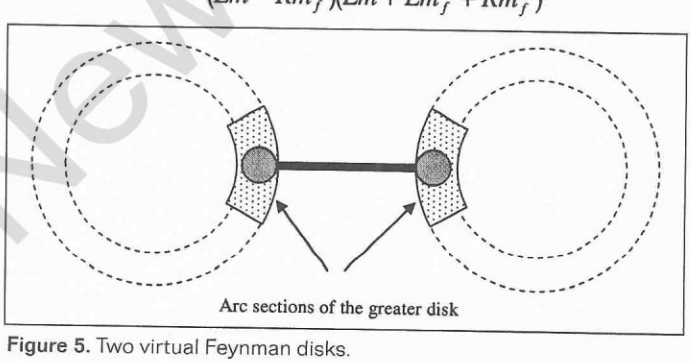

Figure 5. Two virtual Feynman disks.

The mass of the field is:

$$\frac{1}{c^2}\frac{\varepsilon_0}{2}\int\left(E^2 + c^2B^2\right)dV$$

$$\approx \frac{\varepsilon_0}{2}B^2V$$

This is scaled to take account that only a sector of the disk exists that we represent by the radius R and arc sector length S, thus:

$$m_f = \frac{S}{4\pi R}\varepsilon_0 B^2 V \tag{8}$$

From Equation 3 we note that the structure is in internal mechanical equilibrium so the electric field and stress tensor do not come into play. Also the magnetic field travels with the structure so the relative velocity is zero, thus the Lorentz term is not important. What we are left with is the Poynting term that gives the torque. If we cycle the electric and magnetic fields at frequency F: $E(t)=E_{max}Ft$ and $B(t)=B_{max}Ft$, the expression for the torques becomes:

$$\tau = \frac{1}{2}\varepsilon_0 BEVF \times R$$

We take an average for τ over the cycle and we scale the expression by the average value. The disks are just part sectors so we must scale them by the sector length S, *i.e.* by $S/2\pi R$ (ExB is an expression for energy/power which is proportional to volume) obtaining finally:

$$\tau = \frac{\varepsilon_0}{4\pi}BEVFS \tag{9}$$

Now we can substitute Expressions 8 and 9 in 7 [We note that $f \to 0$ as $R \to \infty$ and $\theta \to 0$ by writing $S=R\theta$, $V \propto R$ (since it is a cylinder). We get f in terms $O(R\theta^2) \to 0$.]:

$$f = -\frac{1}{4}\frac{\varepsilon_0^2 EB^3FV^2S^2\left(8\pi mR + \varepsilon_0 B^2VS\right)(2R + L)}{R\left(4\pi mL - \varepsilon_0 B^2VS\right)\left(\varepsilon_0 B^2VLS + \varepsilon_0 B^2VRS + 4\pi mLR\right)}$$

Which can approximate down to:

$$f = -\frac{\varepsilon_0^2 EB^3V^2FS^2(2R + L)}{8\pi mL^2R} \tag{10}$$

Let us substitute some "achievable" figures into the expression to estimate the force:

$B = 100T$ $E = 10^7 V/m$ $F = 100GHz$ $L=R=S = 1m$ $m = 10kg$ $V = 10m^3$

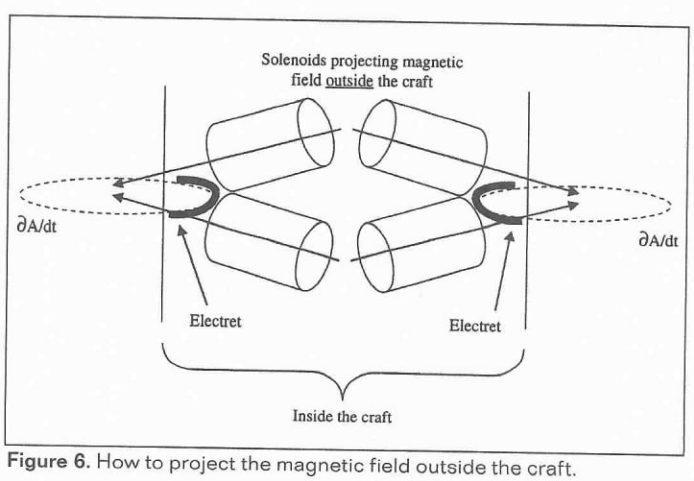

Figure 6. How to project the magnetic field outside the craft.

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We obtain a magnitude of around 100N. Obviously some very high specification materials and methods are required but there is no reason why we can't re-capture the field energy on each cycle (something like an LCR circuit or cavity oscillator) to leave a very energy efficient process.

An issue already raised is the radiation resistance of Lorentz frictional force from moving the electric field around dielectric. Reference 4 and Appendix 3 gives this as:

$$f_{res} = \frac{2e}{3c^3}\dddot{d} \tag{11}$$

And so is totally negligible.

The proceeding analysis was on the basis that the momentum time average was not zero over a cycle. We shall delve into this more:

$$\langle p \rangle = \frac{1}{T}\int_T \left[\varepsilon_0 \int_V (B \times E) dV \right] dt \tag{12}$$

Consider this for a plane electromagnetic wave: $B=B_m\sin(\omega t)$ and $E=E_m\sin(\omega t)$. Thus <p> will be $B_mE_m/2$ integrated over the volume and so an electromagnetic wave transfers momentum and this figure is *independent* of frequency. In our propulsion case the electric field is fixed to that of the electret's field, thus the integral is:

$$\langle p \rangle = \frac{1}{T}\int_T \left[\varepsilon_0 E \int_V B_m \sin(\omega t) dV \right] dt$$

If we can cancel the second half of the cycle we will achieve a force *proportional* to the cycling frequency, otherwise the net force is zero. Put another way, since the force is the time derivative of the momentum this follows:

$$\begin{aligned} \langle f \rangle &= \frac{1}{T}\int_T \left[\frac{d}{dt} \int_V \varepsilon_0 (B \times E) dV \right] dt \\ \langle f \rangle &= \frac{1}{T}\left[\int_V \varepsilon_0 (B \times E) dV \right]_T - \frac{1}{T}\left[\int_V \varepsilon_0 (B \times E) dV \right]_0 \end{aligned} \tag{13}$$

Thus for a cyclical process the average force is zero. We shall try to understand if there is a way around this but one thing is sure, for the cyclical process it is impossible. There is an impulse in the forward sense on switch-on and one in the reverse sense on switch-off. One might concoct some scheme of using two such devices and rotating them at right angles to the intended direction of movement so that their switch-off transients are harmlessly set in opposition (either compression or tension of the member connecting them). The killer argument against any such scheme is that as the field sweeps out its path in space that momentum is conserved at each stage: when the field increases as it enters the region and then decreases as it leaves the region.

A more promising approach is to somehow cancel the E-field around the collapsing magnetic flux on the second half of the cycle. *This attacks the problem head on*; the force on the electret is due to the tangential electric field of the magnetic flux collapse. We cannot just cancel the E-field from the electret (discharging it, etc.) because the force from the Poynting vector will be the differential of the product of the B and E fields—returning to our earlier point, any form of cycling of these fields will lead to net zero force. We have to *cancel* the imposed electrical field by switching solenoid(s) whose field centers are internal to the craft at the same instant as the externally projected magnetic field changes. Being internal, the solenoids will only cause rotation about the system center of mass; there is no effect on the translational forces and this rotation can be cancelled anyhow by a counter arrangement. Figure 7 is an elaboration of Figure 6 and shows the cancellation scheme. The external field projecting solenoids are not shown for clarity.

Figure 8 shows the E field from the collapse of the magnetic fields. The left-hand figure shows the field from the externally projecting solenoids and the dotted line from the inner cancellation solenoids. A staggered cancellation pulse will resolve into an E field at the electret in one sense only.

As to the momentum balance, that requires further work. It may go away with the burst of electromagnetic radiation as the external magnetic field collapses—though that is hard to argue, as momentum flux is independent of frequency whereas for this device it is linear with frequency (Appendix 4). As mentioned in the Graham and Lahoz paper[5] it seems that the electromagnetic momentum in the static induction case "behaves like a superfluid" circulating in opposition to the mechanical part. If the cancellation scheme does work (more experiment or theory) it is only vague to suggest that it is somehow dissipated on the zero state of the field and pushes ultimately against this huge mass-energy.

Work along the lines of a sub-ensemble of quantized harmonic oscillators, representing the macroscopic fields of the device, being randomized by zero-point interaction on field switch-off by the greater ensemble of the ground-state of the field and losing their momentum by a many bodied interaction, seems a promising candidate mechanism. It is similar to a high-speed jet of water colliding with the ocean. This mechanism also appeals to the author's background with ferrofluids[10] whose nanometer-sized dipoles sum to give the macroscopic field and "relaxation" on removal of the exter-

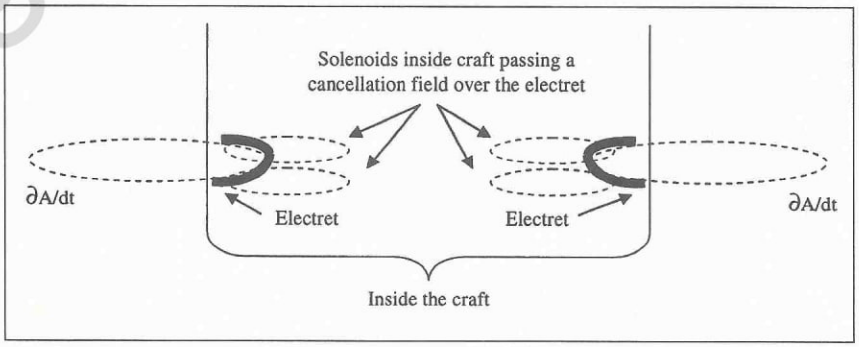

Figure 7. Cancelling reverse thrust on switch off.

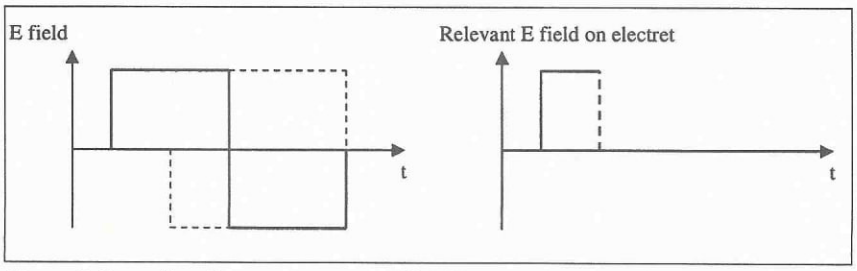

Figure 8. Cancelling the negative external field by a positive internal field.

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nal field. Though, alas, this analogous process can have zero hystersis and does not constitute a momentum sink.

Next we shall tentatively suggest some practical schemes that really should be expanded in another paper.

Early Thoughts on Implementation and Engineering of Proposed Propulsion

At this stage the author has given only cursory thought to making a device, being more concerned with the thought experiment and the theory base. However, a twin pronged attack by theory and experiment could be warranted if theory proves contentious. The magnitude of the forces can be small, especially more so with rough, early engineering technique. Suggestions are to use some kind of "field re-cycler" or regenerator to efficiently cycle the electric and magnetic fields to avoid having to waste power on each cycle; something like an LCR (or cavity oscillator) circuit should prove possible. As regards materials, special high permittivity and permeability materials abound such as barium titinate and metallic glasses respectively and these will act to boost fields for those not with the budget for superconducting materials.

As always, early prototypes are rough and if the approach proves correct, considerable manpower donated to the project will no doubt lead to high performance units. The approach has the potential to generate large forces efficiently, certainly when compared to other proposed electromagnetic propulsion schemes.

Conclusion

We have seen a method of propulsion using known phenomena and standard methods that is apparently permissible within the conservation laws barring something subtle along the lines of another hidden momentum trap (see Appendix 4). One needs to be clear in one's mind to the three momentum terms, which are: radiative, static field energy related, and induction fields (the forces on the electret). Respectively their momentum contributions are miniscule, cyclical (hence null), and linear in frequency and potentially large (Appendix 4). Further enquiry may produce something beautiful, fundamental, an profound or "just" prosaic on the engineering plane.

Appendix 1—Conservation of Momentum

This presentation is largely a précis of relevant sections in Reference 2. It is placed here in conjunction with the rest of the text of this paper to form good immediate reference.

The greatest, most unifying law in physics is the Principle of Least Action. Rather than specify differential equations that describe the time evolution of the system per instant, the Least Action principle, for one form, comes up with a mathematical function based on position and velocity that describes the system *globally*. This is called the Lagrangian and is a function of kinetic and potential energy of the system. By mathematical transformations the two approaches (local and global) can be shown to be the same.

All this extra mathematics is not for pedantry though, as the approach is extremely economic and brings all of the laws of physics into the same method. In this system certain laws or truths of Nature become readily apparent, regardless of the physical phenomena and a new depth of understanding becomes clear. The author considers this important in such a field like propulsion where people have trouble seeing the "wood from the trees." Many claimed devices beggar belief and intuitively one thinks Nature just can't be like that! The Least Action approach provides flesh for the bones of that intuition through conservation laws.

The action (units Js) is the time integral of the Lagrangian:

$$S = \int_{t_1}^{t_2} L(q, \dot{q}, t)dt \qquad \text{(A1.1)}$$

The Principle of Least Action is invoked thus:

$$\delta S = \delta \int_{t_1}^{t_2} L(q, \dot{q}, t)dt = 0 \qquad \text{(A1.2)}$$

The q and dq/dt can be expressed as so-called "generalized co-ordinates" where they don't have to literally be Cartesian co-ordinates but any convenient abstraction such as angle and radius for instance. Indeed the power of the approach can lead to further abstraction in describing anything that is subject to the variation (the field potential in the action for the field[4]).

Taking the first variation[2] we arrive at Lagrange's equations:

$$\frac{d}{dt}\left(\frac{\partial L}{\partial \dot{q}}\right) - \frac{\partial L}{\partial q} = 0 \qquad \text{(A1.3)}$$

Which is just really Newton's Second Law (ma - F = 0) but derived in a more fundamental and general way.

Homogeneity/Isotropy of Space-time and Relativity Principle Leads to Inertia

Space being the same in all directions and times (we perform an experiment in one place at one time in one direction and obtain the same result another time, another place in another direction and find the same result) must mean that the Lagrangian (L) cannot explicitly contain a radius vector, t. Also we know that if we are travelling at speed in a steady fashion we cannot detect differences (this argument is non-Relativistic[4]) in our experiment, thus L is a function of v^2. Applying this to Lagrange's Equation A.3 and noting that q is **r** and dq/dt is **v** and $\partial L/\partial \mathbf{r} = 0$ since L doesn't contain **r** explicitly we find:

$$\frac{d}{dt}\left(\frac{\partial L}{\partial v}\right) = 0 \qquad \text{(A1.4)}$$

$$\Rightarrow v = const$$

That is, in an inertial frame, motion goes with uniform velocity. This is the law of inertia and this follows from homogeneity/isotropy of space-time and relativity, which follow from *experiment*.

Homogeneity of Space Leads to Conservation of Momentum

Let us consider the change to a system's (hence the sum) Lagrangian function by changing the radius vector **r** to **r**+ε, that is a translation in space:

$$\delta L = \sum_a \frac{\partial L}{\partial r_a}\delta r_a = \varepsilon \sum_a \frac{\partial L}{\partial r_a} \qquad \text{(A1.5)}$$

As we know from experience, there is no change in the experiment so δL=0 but ε is non-zero so:

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$$\Rightarrow \sum_a \frac{\partial L}{\partial r_a} = 0$$

$$\Rightarrow \frac{d}{dt}\sum_a \frac{\partial L}{\partial v_a} = 0$$

The last step is obtained from Equation A1.3. Thus we have a conserved quantity, called the momentum:

$$\vec{P} = \sum_a \frac{\partial L}{\partial v_a} = \sum_a m_a v_a \qquad \text{(A1.6)}$$

Incidentally, conservation of angular momentum and energy proceed in much a similar manner.[2] This is expressed in Relativistic Mechanics elegantly as the conservation of "momenergy."[4,9] The unity of space and time is exposed, its homogeneity and isotropy. Indeed just as we can translate an experiment in space and obtain the same results, we can transfer an experiment in time; as far as we know, the physical constants of the Universe don't change and we get the same result.

My point to this appendix: The Universe seems to be a bland canvas to work upon. We must tread carefully when we purport propulsion or inertia reducing devices (free energy devices too) and fundamentally understand what that means—we have given a preferred direction to space. This begs the question, by what mechanism or just *how* do you do that?

Appendix 2—The Lagrangian of the Electromagnetic Field and Charged Particles

We shall derive Equation 3 in the main text of this paper. Please consult relevant sections in Reference 4 for development of the action when electromagnetic forces are at play.

Equation 27.7[4] shows the action for field and particles to be:

$$S = -\sum \int mcds - \sum \int \frac{e}{c} A_k dx^k - \frac{1}{16\pi c}\int F_{ik}F^{ik} d\Omega \qquad \text{(A2.1)}$$

We write this in 3-space form more amenable to engineers as:

$$S = -\sum \int mc^2\sqrt{1-\frac{v^2}{c^2}}dt + \sum \int \frac{e}{c}\vec{A}\cdot\vec{v}dt - \sum \int e\phi dt - \frac{1}{8\pi}\int (E^2 - H^2)dVdt \qquad \text{(A2.2)}$$

where

The four potential is $A^i = (\phi, A)$ in contravariant form

Where

ϕ is the scalar potential

A is the vector potential

And

The four potential in co-variant form is $A_i = (\phi, -A)$

And, the electromagnetic field tensor is $F_{ik} = (E,H)$ or $F^{ik} = (-E,H)$

$$F_{ik} = \begin{pmatrix} 0 & E_x & E_y & E_z \\ -E_x & 0 & -H_z & H_y \\ -E_y & H_z & 0 & -H_x \\ -E_z & -H_y & H_x & 0 \end{pmatrix} \qquad F^{ik} = \begin{pmatrix} 0 & -E_x & -E_y & -E_z \\ E_x & 0 & -H_z & H_y \\ E_y & H_z & 0 & -H_x \\ E_z & -H_y & H_x & 0 \end{pmatrix}$$

Equation A2.1 is made up of three parts: $S = S_m + S_{mf} + S_f$ that is a mechanical part, a field and mechanical part, and a field part. If we are not concerned with electromagnetic interactions we ignore S_{mf} and S_f and obtain the familiar action and Lagrangian that solely describes classical mechanics:

$$L = -\sum mc^2\sqrt{1-\frac{v^2}{c^2}} \qquad \text{(A2.3)}$$

When the field is *taken as a given* and we include the action S_{mf} which only includes the field potentials and charged entities of the system, the following Lagrangian is obtained:

$$= -\sum mc^2\sqrt{1-\frac{v^2}{c^2}} + \sum \frac{e}{c}\vec{A}\cdot\vec{v} - \sum e\phi \qquad \text{(A2.4)}$$

From the above we can derive the Lorentz force by use of Lagrange's Equation[4] A1.3.

$$\frac{d\vec{p}}{dt} = e\vec{E} + \frac{e}{c}\vec{v}\times\vec{H} \qquad \text{(A2.5)}$$

In doing so the electric and magnetic fields have been derived from ultimately the four potential and thus two of Maxwell's equations (curl **E** and div **H**) are defined. Addition of the field action S_f allows the other two Maxwell equations to be derived[4] and we see that A2.1 is an incredibly compact statement of classical electrodynamics.

When we don't take the field as given we must also include S_f. This allows the interaction of the particles to generate new fields and more profoundly, lets the field "live" as an interacting system whose changes propagate at speed c. The field becomes very real and as we shall see has energy density and momentum.

In 3-space we have seen how we can relate the Lagrangian to the quantity called momentum and derive its conservation law. A similar procedure can be carried out [though more involved and with the Lagrangian density for greater generality especially with regards to fields] in 4-space relativistically where the Energy-Momentum Tensor, T^{ik}, links the concepts of energy and momentum. Conservation of "momenergy" is expressed as:

$$\frac{\partial T_i^k}{\partial x^k} = 0 \qquad \text{(A2.6)}$$

The vanishing of a four divergence expresses a conservation law. Let us give an example with the conservation of charge:

$$div\vec{j} = -\frac{\partial \rho}{\partial t} \qquad \text{(A2.7)}$$

In 3-space form the rate of loss of charge in an infinitesimal cube is related to the flow of current (a vector) from the infinitesimal cube (so current density). It's just like emptying a tank. In relativity time and space are unified and so the time part and spatial part (div = $(\partial/\partial x)\mathbf{i} + (\partial/\partial y)\mathbf{j} + (\partial/\partial z)\mathbf{k}$) of our charge/current concept[2,3] become a "four-vector" $j_i = (\rho, \mathbf{j})$. The 4-form of the gradient operator is $(\partial/\partial t, -\nabla)$ and so when we take the dot product of this operator with the current four-vector we see that the conservation law is expressed readily in relativity as:

$$\nabla_i J_i = 0$$

We draw further analogy: we can apply Gauss' Law[3] to say a region of space with a charge expressed in differential form (div) and derive the total charge in a volume; or we could form a volume around a distribution of current expressed differentially and obtain the current into and out of the volume. Similarly we can apply a 4-dimensional version of Gauss' Law to our energy-momentum tensor integrating over a hyper-surface and find the flow of momentum to and from a volume in space. We obtain the momentum from the energy-momentum tensor thus:

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$$P^i = \frac{1}{c}\int T^{ik} dS_k \qquad \text{(A2.8)}$$

Thus we relate the Lagrangian to a Lagrangian density (*i.e.* dealing with infinitesimal volumes not macroscopic objects) to the energy-momentum tensor and to the momentum to and from a volume. Now we have the means to work out momentum concepts on something as nebulous as a field.

As an aside, explaining the concept and need of a tensor is beyond the scope of this appendix,[3,4] but a tensor, which is just like a matrix, allows us to define an object independent of a co-ordinate system. We find "we need more numbers" to describe each point of our object or field but by a process akin to matrix multiplication, we can "contract"[4] the description down to a normal vector when we impose a co-ordinate. Expressing laws *independent* of a co-ordinate system is called making laws co-variant and ultimately is the goal of relativity, *i.e.* physics.

We list the components of the energy-momentum tensor, which describes the flow of energy and momentum to a volume:

$$T^{ik} = \begin{bmatrix} W & S_x/c & S_y/c & S_z/c \\ S_x/c & -\sigma_{xx} & -\sigma_{xy} & -\sigma_{xz} \\ S_y/c & -\sigma_{yx} & -\sigma_{yy} & -\sigma_{yz} \\ S_z/c & -\sigma_{zx} & -\sigma_{zy} & -\sigma_{zz} \end{bmatrix} \qquad \text{(A2.9)}$$

Where

$T^{00} = W$ is the energy density in the volume
$(1/c)T^{\alpha 0} = g$ is the momentum density (via A2.8, the spatial components of P^i is momentum)
$cT^{0\alpha} = S$ is the energy flow per unit volume per unit time across the volume (via A2.8 the vector formed contracting along T^{0k} is energy related, if $T^{00} = W$ is energy density then spatial components are flow of energy)
$\sigma_{\alpha\beta}$ is the Maxwell Stress Tensor

If T is symmetrical (and can always be made so[4]) $T^{0\alpha} = T^{\alpha 0}$ then

$$\vec{S} = \vec{g}c^2 \qquad \text{(A2.10)}$$

Equation A2.10 is a very important equation of relativity but can just be thought of as $E=mc^2$ with a flow of energy and a flow of mass hence momentum.

Without derivation[4] (from the action of the field S_f) we quote the energy-momentum tensor for the electromagnetic field relating it to the electromagnetic field tensor:

$$T^{ik} = \frac{1}{4\pi}\left(-F^{il}F_l^{\,k} + \frac{1}{4}g^{ik}F_{lm}F^{lm}\right) \qquad \text{(A2.11)}$$

We are then able to relate components of the energy momentum tensor to the electric and magnetic fields. Thus:

$$T_{00} = W = \frac{E^2 + H^2}{8\pi}$$

$$cT^{0\alpha} = \varepsilon_0\mu_0\vec{E}\times\vec{H} \quad \textit{Poynting Vector}$$

$$\sigma_{\alpha\beta} = \textit{Maxwell Stress Tensor}$$

Thus when we compute the momentum via A2.8 and differentiate with respect to time we obtain:

$$\rho_m\dot{v} - \nabla\cdot T + \frac{\partial}{\partial t}\varepsilon_0\mu_0\mathbf{E}\times\mathbf{H} = 0$$

When we include S_{mf} and the force from action of the field and mechanical part we obtain the Lorentz force. In total then for $S_m + S_{mf} + S_f$ we obtain Equation 3 in the main text.

Appendix 3—Lagrangian of the Field to Third Order and Radiation Resistance

In the previous appendix we showed how the action for the field must be included in the total action to get the correct electrodynamics of charges subject to the field. The underlying reason for this is that fields transmit their information at the speed of light—it is not instantaneous, there is no mystical action at a distance as in Newtonian mechanics.

Rather than use the full might of the field action term S_f we can expand the field terms in S_{mf} by use of retarded potentials and *approximate*:

$$\phi = \int\frac{\rho_{t-R/c}}{R}dV \qquad \vec{A} = \frac{1}{c}\int\frac{\vec{j}_{t-R/c}}{R}dV \qquad \text{(A3.1)}$$

That is, we use the fields not at "this" instant from the charges generating the field to the charge being influenced but earlier to allow travel time. We do not go into full details here[4] but essentially what happens is that we expand the potentials in a Taylor series of powers of R/c with the proviso that the charge distribution doesn't change significantly in the time R/c to make the approximation work.

When we expand to the third order, important interesting effects of the electromagnetic field interaction with particles become apparent. Reference 4 gives these potentials as:

$$\phi^{(3)} = -\frac{1}{6c^3}\frac{\partial^3}{\partial t^3}\int R^3\rho dV \qquad \vec{A}^{(2)} = -\frac{1}{c^2}\int\vec{j}dV \qquad \text{(A3.2)}$$

We note that we only go to terms of second order in the vector potential because in Expression A2.2 that it is multiplied by 1/c anyway. We summarize the derivation in Reference 4: a gauge transformation is made to eliminate the third order scalar term; this doesn't matter, as the physics is the same leaving only the second order vector potential term.

$$\vec{A}'^{(2)} = -\frac{2}{3c^2}\sum e\dot{v} \qquad \text{(A3.3)}$$

The integration over a charge distribution has been reduced to a sum over individual charges. This second order term generates no magnetic field (**H**=curl A) as it does not contain spatial co-ordinates explicitly but it does generate an electric field ($E=-(1/c)\partial A/\partial t$) and hence force on a charge:

$$f = -\frac{2e}{3c^3}\dddot{d} \qquad \text{(A3.4)}$$

Appendix 4—Answers to an Internal Critique of an Earlier Draft of the Paper

Introduction

In the said paper a device was discussed whose purpose was to allow a craft to accelerate by a means of propellant-less electromagnetic propulsion. Simple linear translation is forbidden by "hidden momentum," however Nature does allow angular translation as exemplified in the Feynman disk. It was the task of the paper to convert these angular motions into linear motion. Now there is no doubt that the arrangement of disks will lead to linear motion, however the effect is symmetric with the craft returning to its starting point after the cycle "field on, field off." Thus a scheme was con-

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trived to eliminate the second half of the cycle to allow the craft to accelerate by cancelling the effect of the changing magnetic field on the electret ("decoupling" the electromagnetic aspects of the system from mechanical part). If such a scheme is possible at all, one surely must ask: what happens to the compensating momentum, how is it carried away? Just by theoretical reasoning it is important to ask this question, as fundamental arguments kill all engineering contrivances.

Four ideas become apparent if net motion is at all possible or not:

1. The belief that some strange hidden momentum effect prevents the device from operating.
2. The belief that a "chunk" of electromagnetic mass in the fields set up somehow heads rearwards and is discarded.
3. The belief that it is a photon rocket with electromagnetic wave energy heading rearwards.
4. The belief that the field cancellation scheme can't work, as there is no distinction between rotations on different radii. The cancelling solenoid will just return the craft to its initial position.

Point One

Hidden momentum arises from considerations regarding the relativistic fluid of electrons constituting the current in the solenoid.[7,8] Subject to the field from the electret, the charge carriers experience a change in their mass from the potential energy they achieve in the field. This argument is only relevant in the *static* case which this isn't, but to further dispel it consider Figure 9, which is a variant of Figure 6 in the paper.

The electret is shielded by a box open at one end to the outside of the craft and the external field. The box is held at ship's potential and thus the hidden momentum argument is not valid.

Point Two

Consulting Figure 6 of the device paper we see that electromagnetic energy is projected outwards from the craft but this is *not* the net mechanism by which the craft is propelled forwards. The energy is recalled to the craft at the end of the cycle. The net momentum from this setting up and removal of the external field is zero. Sure enough the flow of energy can be represented by a Poynting vector of the propagation of the changing E and B fields but it is *distinct* from the propulsive effect of the changing E field on the electret. One displays momentum transfer by acting on the *solenoid* (the radiation field, see point three), the other on the *electret* (the induction field). Thus we have two momentum density terms on a half cycle:

$$g_{Solenoid} = \varepsilon_0 \frac{\partial}{\partial t}(B^2)$$

$$g_{Electret} = \varepsilon_0 (B \times E)$$

For the first expression it is easier to divide the known final expression for the energy density by c^2 than compute the time varying Poynting expression. So clearly the argument that the propulsion comes from ejection of field energy of the solenoid is not valid.

Point Three

A photon rocket is a puny thing; the majority of the energy developed goes into the rearward beam and not the kinetic

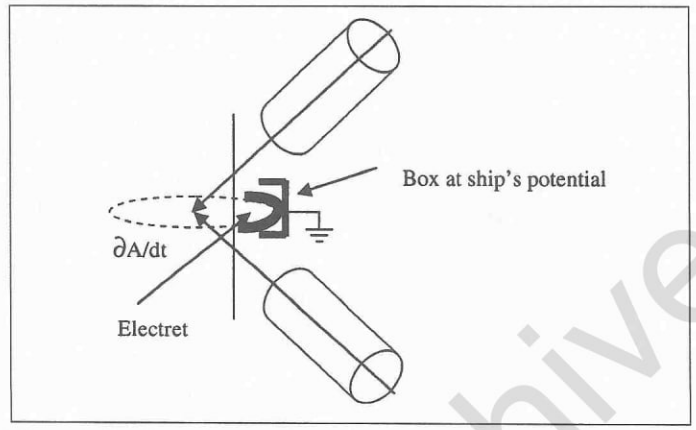

Figure 9. Shielding the solenoids from the electret.

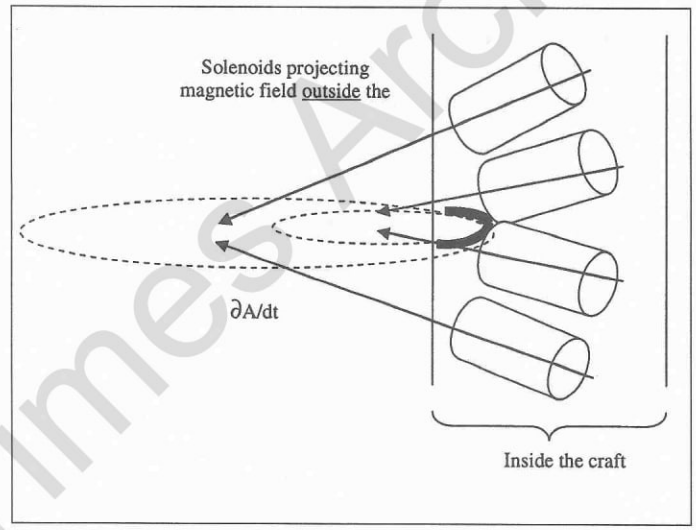

Figure 10. Non-commutation of rotations about different centers.

energy of the craft. *In no way is it implied by the Feynman disk that radiation emanates and provides all the momentum balance.* In Appendix 3 of the paper we see that radiation effects are put off to the second order in the vector potential and the force is of the order:

$$\vec{A}^{(2)} = -\frac{2}{3c^2}\sum e\dot{v}$$

The E field from the above expression is then $E=-(1/c)\partial A/\partial t$. The force on charged entities constituting the solenoid current from the *radiation* field is thus of the order of $1/c^3$ down on the forces generated on the electret by the *induction* fields:

$$\varepsilon_0 \int_V \frac{\partial}{\partial t}(B \times E)dV$$

In fact the radiation is so miniscule that we didn't even calculate it and can say with very high accuracy that all the energy developed goes into the kinetic energy of the craft, much as though we were pushing against a very large mass.

We draw attention to Equation 12 and the paragraphs following it on page 8 of the paper rather than reproduce it here.

To stress the point again that we are dealing with two different effects, the momentum exchange from the radiation field and the force on the electret from the induction field (point two), note that for a photon rocket momentum flux is independent of frequency, however for the device it is linear in frequency.

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It seems fanciful to say that the device is pushing against the ground state, but we have shown that something is seriously amiss.

Point Four

This point is related to the fact that one can translate through space by rotation because rotations do not commute. Thus we shall show that point four is not valid.

Consider a simplified device (Figure 10). It is not designed to accelerate but comes to rest in the original frame and translated in a one-shot operation. There is no field cancellation scheme. It consists of two sets of projection solenoids and has two centers of rotation.

Non-commutation of Rotations

We can represent the process of rotation in a Cartesian system by matrices. Sequences of rotations then become a string of matrix multiplication operations. Each operation can be considered to transform to a new co-ordinate system; the result of the multiplication is the co-ordinates as viewed from the old system.

A rotation by angle θ is given by:

$$R_\theta = \begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix}$$

It is easy to verify that $R_\theta R_\theta^{-1} = I$, that is, a rotation and its reverse rotation give back the original position vector.

Let us model the simplified device by a sequence of operations taken non-commutatively as the rotation of a position vector (D 0) by the first angle about a radius D, a shift in the co-ordinates and rotation to affect a rotation by the second angle about a radius d, then rotate by minus the first angle and then rotate by minus the second angle. Thus:

$$R_\beta^{-1}\left[R_\alpha^{-1}\left[R_\beta\left[R_\alpha\begin{pmatrix}D\\0\end{pmatrix}-\begin{pmatrix}D-d\\0\end{pmatrix}\right]+\begin{pmatrix}D-d\\0\end{pmatrix}\right]-\begin{pmatrix}D-d\\0\end{pmatrix}\right]+\begin{pmatrix}D-d\\0\end{pmatrix}$$

After these operations the position vector is:

$$\begin{pmatrix} 2D - d - (D-d)(\cos\alpha + \cos\beta - \cos(\alpha+\beta)) \\ -(D-d)(\sin\alpha + \sin\beta - \sin(\alpha+\beta)) \end{pmatrix}$$

We can see that if the *radii are different* and the angles non-zero, the final position vector is not equal to the start.

Conclusion to Answer of the Critique

It has been shown that there are two distinct momentum transfer terms, one for the external field and the other for the electret. However, the net momentum exchange from setting up of the external field is zero. As regards the mechanism for the propulsion by action of the electret it has been made clear that there are two mechanisms of momentum transfer; one mechanism is by radiation fields, the other is by induction fields. The radiation fields are miniscule, of order $1/c^3$ down on the induction fields. Added to this too, radiation can only ever produce a force independent of frequency but the device is linear in frequency. The device is thus not a photon rocket.

Objections to the field cancellation scheme have, we hope, been agreeably dispelled. It is clear that one can translate through space by two rotations on different radii. The implication of this being that the cancellation solenoid doesn't merely return the craft to its original position.

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About the Author

Mr. Cornwall has degrees from UMIST and London University and a background in software engineering and electronics. Currently he is studying for a Ph.D. at the University of Brighton, with his first project of thermoelectric power conversion. This project will soon come to fruition. Mr. Cornwall's other interests are all aspects of science, music, current affairs, history, and sport.

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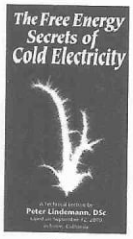

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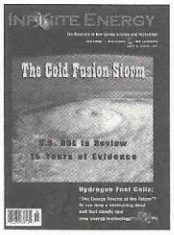

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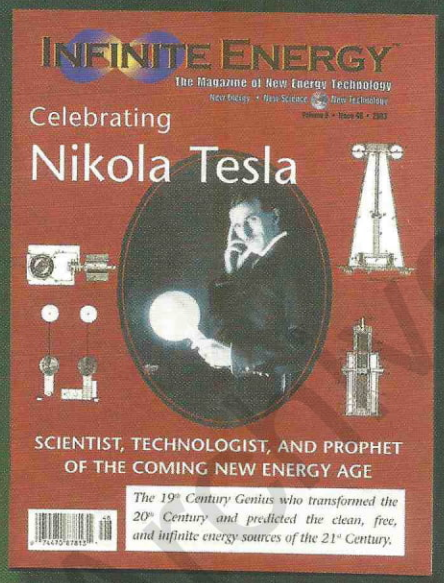

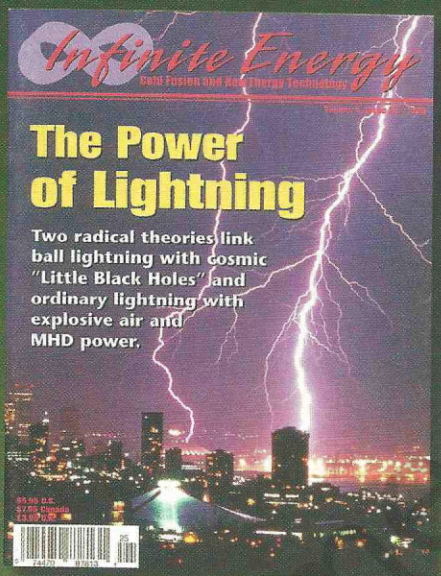

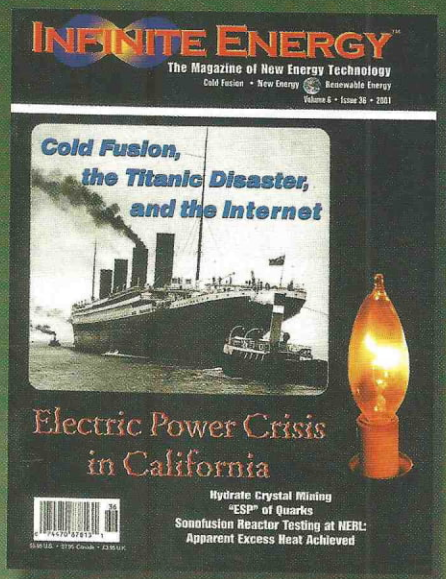

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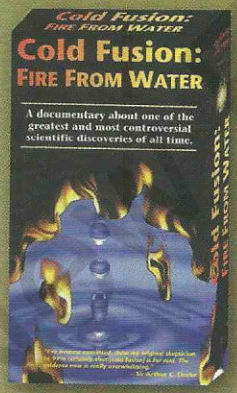

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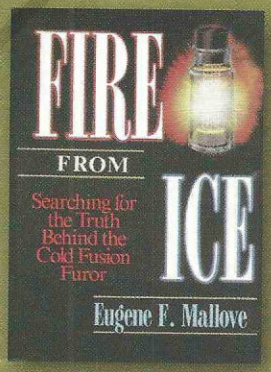

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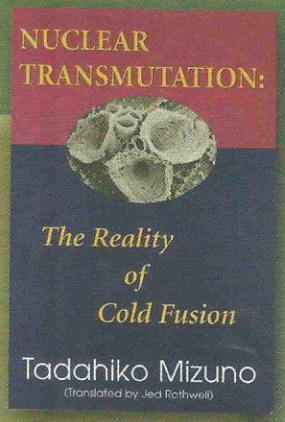

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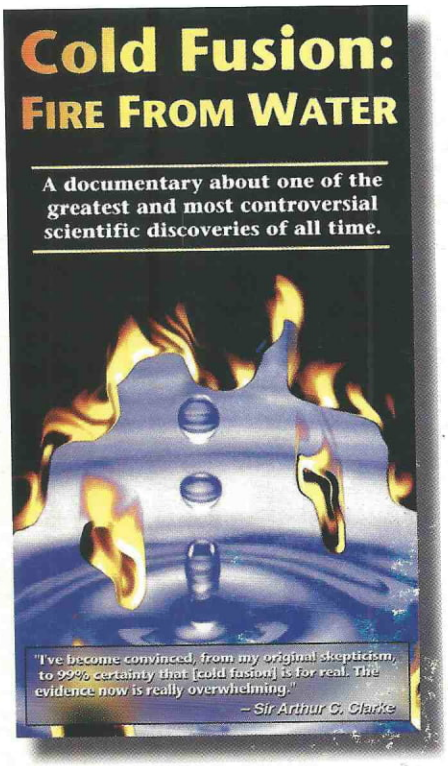

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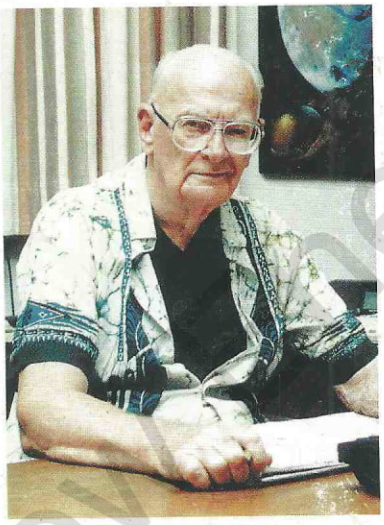

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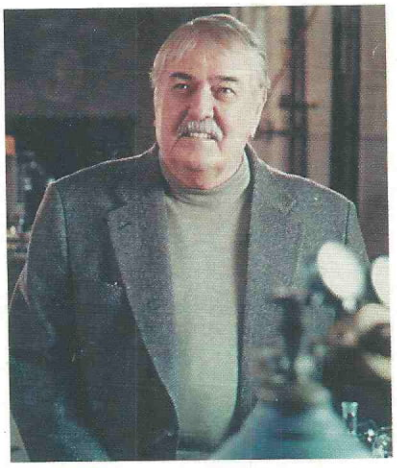

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